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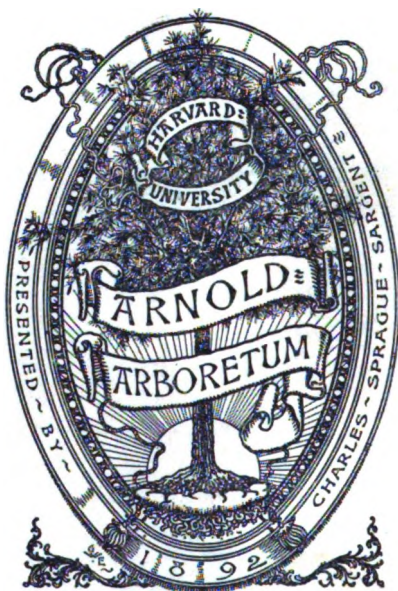
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*Journal of the
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Per BI
27





SIR TREVOR LAWRENCE, BART., K.C.V.O., V.M.H.

A List of the Subscribers to the Portrait will be found on page 289.

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JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

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VEGETATIVE SPORTS AND FLORAL FREAKS.

By the Rev. Professor G. HENSLow, M.A., F.L.S., V.M.H.

[Lecture given on March 14, 1905.]

ALL plants apparently have the power to vary, under altered conditions of life. In nature this power shows itself in response, if not in useful adaptations, to the environment. We thus find not only a peculiar *facies*, or a general and similar physiognomy characteristic of aquatic, desert, maritime, and other groups of plants respectively, but that their internal anatomy corresponds with their external appearances.

When wild plants are submitted to cultivation in a prepared and highly nutritious soil, they as a rule soon show some differences of structure; and when they have been long cultivated, the number of varieties may become very great; as of all the cabbage tribe, which originated from the single species, *Brassica oleracea*, of our chalk cliffs.

Now, these variations appear to arise in two ways. They may be slow in coming, so that when the cultivator sees some slight alteration in the offspring, he isolates it and carefully selects the best out of the seedlings, which show the peculiarity, till at last he has established a new "strain" or "race" in, as an average, about five or six years.

Sometimes, however, a more marked variation appears suddenly, either among the seedlings or upon one branch of a plant which is otherwise normal. This may occur in the stems, foliage, flowers, or fruit. When it occurs on a growing plant, or as a seedling, it is called a "sport,"* and is due to "bud-variation."

If it be cut off, it can give rise to a plant, from which cuttings can be taken, and so the peculiarity can be perpetuated and multiplied. A very great number of shrubs with variegated foliage and flowers of different colours have been permanently secured in this way. Sometimes, but not generally, the sport can be propagated by seed.

* Mr. B. D. Jackson defines a sport as "a variation starting from a bud or seed."
(*Glossary of Botanic Terms.*)

But little, if anything, is known as to the immediate causes of many instances of sporting. Varying degrees of nutrition seem to govern them to some extent; thus a branch of a beech or other tree may suddenly bear deeply dissected leaves. Such have given rise to "cut-leaved" varieties. Now, as there is obviously less material in a slashed leaf than in an entire one of the same area included within the same general outline, it is not unreasonable to assume that from some cause or other the bough had less nourishment at its disposal wherewith to make its leaves perfect. But a peculiarity is that, once formed, the "habit" of making them may become perpetuated; for, as said, if such a bough be propagated a cut-leaved tree will result. Conversely, a single bough of such a tree may suddenly "revert" to the normal character, and produce leaves like the original and ordinary beech-tree. Nutrition, too, is the chief cause of the production of garden varieties of vegetables.

It is also to some extent "infectious," so to say; for M. Carrière, in a work entitled *Production et fixation des Variétés dans les Végétaux*, states that a cut-leaved branch of a beech having been grafted upon a common beech, subsequently all the branches above and on the same side as the graft bore divided leaves, while all on the other side of the tree bore ordinary leaves.

There is a difficulty in drawing any sharp line of difference between sports, monstrosities, and varieties, especially under cultivation; and the degree of difference is a very arbitrary matter with many cultivators, who issue new "varieties." For example, the old form of tomato with a ribbed surface was the result of a monstrous (multifold) flower, like the many-petalled 'Victoria' Forget-me-not; but compared with the globular fruit from a normal flower, the former would be called "variety," if not a "monstrosity."

Moreover, many a so-called sport on one plant, which never previously was known to bear it, may be of normal and regular occurrence on another plant, when it would not be so regarded at all.

Stems, fastigate Sports.—The direction of the boughs may suddenly vary. Thus the ordinary yew has horizontal boughs, the short stalks of the leaves twisting so as to bring them into one plane at right angles to incident light. In the "fastigate" variety, or the Irish yew, the boughs are erect, and the leaves spread out all round the branches. The cypress and the tall Lombardy poplar are similar varieties of trees originating from others, which have a spreading habit.

Dr. Falconer says the English Ribston-pippin apples, a Himalayan oak, *Prunus* and *Pyrus*, assume in the hotter parts of India a fastigate or pyramidal habit. A Chinese tropical species of *Pyrus* naturally has this habit of growth (Darwin, "An. and Pl. under Dom." ii., p. 277). It is not usually hereditary, but Darwin mentions cases (*op. cit.* i. 361). All Lombardy poplars were derived from the East, so that temperature appears to be the cause.

A similar sport to that of the yew occurred in another member of the same family, viz. *Cephalotaxus pedunculata*, var. *fastigiata*. Plants having been raised by cuttings of what was known as *Podocarpus koriana* (with scattered leaves), one of these produced whorled branches, the leaves on which were horizontal as in an ordinary yew. The inter-

pretation apparently is that the terminal bud received some check so that the internodes between the scattered leaves were so reduced as to compel the branches to grow out horizontally; then, as a consequence of this position, the leaves became horizontal, so as to present their upper surfaces at right angles to the downward direction of incident light.

This case was regarded as a sport, but in the common yew many short branches can be found growing erect, and when this is the case the leaves are scattered and nearly erect too.

But, further, in the yew the leaves arise out of the stem in normal arrangement, say $\frac{3}{8}$ phyllotactically, and they retain this position when horizontal, for this latter position is acquired by twisting their short petioles. If, however, a shoot grows up vertically out of a laurel hedge, the leaves will be found to be on the $\frac{2}{5}$ arrangement, while all on the horizontal shoots are distichous or $\frac{1}{2}$. A similar difference is seen between the leaves of the ivy when climbing, and when the bough grows out freely into the air. This shows that the position of the bough acts more profoundly upon the development of the leaves, for it causes them to issue at quite different places accordingly.

Fasciation.—This phenomenon is extremely common, as in asparagus, and many herbaceous flowering stems. In woody branches, it is by no means uncommon in the ash tree. The immediate cause is unknown, beyond the vague term "hypertrophy." It consists of a multiplication of the fibro-vascular cords by repeated branching; the whole of them being included in the same cellular tissue and epidermis, instead of their growing separately into distinct branches. As a rule it is not hereditary, but it can be so. A common garden nasturtium had its stems partly fasciated, and the peculiarity proved to be hereditary for five years. The cockscomb is an hereditary form of a fasciation of long standing; *Celosia cristata* in its natural condition producing a long feathery inflorescence.

Weeping.—The weeping form of many trees is regarded as a variety, and as a rule can only be perpetuated by cuttings &c.

As the weeping willow has drooping branches when growing by water, but may have them non-weeping if away from it (as is noticeable in the cemetery of St. John's Wood Chapel, London); and the deodar has pendulous branches in England, but as a native on the Himalayas resembles the cedar of Lebanon, atmospheric or terrestrial moisture appears to be the cause; at least it is a coincidence. None of 50,000 seedlings of the weeping elm and ash proved to be able to inherit the habit (Rivers); Mr. McNab, however, records the fact that a seedling from a weeping birch was erect for ten years, but assumed the weeping form subsequently. On the other hand, the late Rev. Prof. J. S. Henslow raised a number of seeds from weeping ash trees. The boughs had some slight tendency to droop for two or three years, but they subsequently became erect.

Spiral Torsion.—When leaves are normally "opposite" and "decussate," as on the common nettle, they may become "alternate," i.e. arranged round the stem singly on a spiral line, as has occurred with that plant. This was a seedling sport; but this change is of normal occurrence in the Jerusalem artichoke and willow herbs; such is not so named in these plants.

There is another kind in which all the leaves are on one vertical line with a strong torsion of the stem. In this case every two alternate leaves of the row constitute the original pairs of opposite and decussate leaves ; but each has been uplifted till they all fall into line.

Spinescence.—Plants growing naturally in dry situations are often spiny, as the furze and needle furze ; but when spiny plants are grown in an abundance of moisture, the spinescence may disappear entirely ; so that although a spineless gooseberry may be called a sport, the cause is reasonably suspected to be an adaptation to moisture.

Bud-sports.—As all the organs of a flower are recognised as having a foliar origin, so leaf-buds and flower-buds can be interchangeable.

In some plants the flowers are normally replaced by vegetative buds, or bulbils, as in the case of species of *Polygonum* and *Allium*.

In grasses, sedges, and rushes &c., it occasionally happens that the florets are replaced by leafy buds. The whole panicle sooner or later falls to the ground, when they strike root and so give rise to independent plants.

Of course vegetative methods of propagation are perfectly normal and of many kinds ; but it is only when a plant suddenly undertakes to do it in some abnormal way that it is regarded as a sport.

Leaves.—The sporting of leaves is very various. In some cases it is apparently due to the atrophy, as in spinescent foliage, and the cut-leaved or lacinated varieties ; sometimes to hypertrophy, as in crisped foliage of the savoys and parsley, &c. Varieties of variegation are innumerable, and they have mostly arisen by accidental sporting ; but the causes are obscure.

Cut-leaved Varieties.—This form of foliage is now characteristic of varieties of many kinds of trees, as of the beech, blackberry, &c. They cannot be depended upon for constancy when raised by seed ; but they have arisen as sports in the ordinary kind. It can be propagated by cuttings and grafts when the character remains permanent ; though a branch on such a tree may, and often does, "revert" to the ordinary form. This is very frequently the case with variegated shrubs and trees, shoots with entirely green leaves only too frequently appearing and depreciating the value and appearance of the plant. When differences thus appear suddenly they are called sports ; but precisely similar conditions often normally exist on some plants, which are thus always characterised by having dissected foliage ; as, e.g. *Malva moschata*, *Broussonetia papyrifera*, the Japanese honeysuckle, &c. The common snowberry may perhaps help us to an interpretation of the phenomenon. Selecting a vigorous yearly shoot, the following facts may be noticed :—The first formed leaves at the base, where energy is not yet vigorous, are small and entire ; towards the middle of the shoot, where energy is most vigorous, the leaves are much larger but more or less lobed. At the close of the year's shoot, the leaves are again small, like the first formed, and entire. It appears from this that at the middle period of growth, when vigour is at a maximum, materials fall short of what is required to make the largest leaves complete ; but as these features may be seen in every bush, every year, they have become fixed and hereditary.

Again, as leaves of a plant, although complete below, often become

dissected above, when the inflorescence is forming; and on a horseradish it was observed that the branch-sport with "cut" leaves also bore inflorescences; this coincidence shows that the cause of the change of form of the leaf in these cases is due to the relaxation of the vegetative function, on the arrival of the period of flowering.*

Perforated Leaves.—These frequently occur when a severe spring has checked the development of buds, so that when the leaves are unfolded they are found full of holes and gashes due to starvation. These are not reproduced without a similar cause. In many aquatic plants, degeneracy has so affected them that they are normally more or less perforated, as in our English pondweeds and the lattice-leaved plant of Madagascar. As Monocotyledons appear to have had an aquatic origin ancestrally, many terrestrial species of aroids have perforated leaves normally and hereditarily; but if such plants be cultivated in a rich soil, they more or less disappear entirely. Conversely, horse-radish plants have large and completely formed leaves in a good garden soil; but if they happen to grow in an impoverished one, they are often deeply incised and resemble a frond of the polypody fern.

Crisped Foliage.—This is produced under the opposite conditions, viz. of superabundance of nutriment. It is due to the fact that more cellular tissue is developed between the fibro-vascular cords than can lie evenly, hence the margin appears crisped or the surface bulging. Such may originate as a sport or by seed, but it is now hereditary, as in parsley and savoy cabbages, &c.

Flowers: Multiform.—The fusion of two or more flowers into one mass is not uncommon as a "monstrosity," and such is called "synanthic": but a commoner sport is the "multiform" flowers, produced by a multiplication of the floral organs, associated with a continuous branching of the fibro-vascular cord, which normally is supplied to each sepal, petal, stamen, and carpel respectively. This is extremely common in strawberries; but it has become hereditary in some cases, as the tomato, and accounts for the numerous lobes to the fruit in the older forms. It is not infrequent in the terminal flowers of herbs with irregular flowers, as the foxglove. This, too, has lately been proved hereditary, more than 90 per cent. of seedlings bearing the large tubular flower with a regular border. A variety of forget-me-not, known as the 'Victoria,' has not only a multiform flower, but fasciated stem, and both characters are more or less hereditary.

Crested Corollas.—A condition allied to the branching of fibro-vascular cords of fasciated stems is produced in these corollas, but every branch has its own cellular tissue, so that it stands freely out from the surface of the petal. It has occurred in the cyclamen, daffodil, and begonia. It is of the same nature as in outgrowths from the ribs and veins of cabbage-leaves.† These outgrowths sometimes assume the form of cups, funnels, or miniature leaves: they then exactly resemble certain forms of degenerate ovules, which also grow out from the margins of carpels in connection with fibro-vascular cords in precisely the same

* For further details the reader is referred to *The Origin of Plant Structure*. p. 247.

† This variety was described and figured by Gerarde in his "Herbal," 1597.

manner. Occasionally even on petals are abortive ovules thus formed. This fact reveals the origin of ovules, viz. that they are really foliar, excrescences modified for a definite and reproductive purpose.*

Peloria.—This name was given by Dan. Rudberg† to a curious condition of the toad-flax (*Linaria vulgaris*), in which the spur characteristic of one petal is developed on each, so that the flower becomes regular by repetition, and the "hood" vanishing, the "lip" becomes a circular rim. In *Calceolaria*, the "slipper" is repeated all round, so that the whole flower assumes the form of a "sleeve." Though these occur as sports, yet the pelorian form of the toad-flax has been proved to be hereditary. Another form of peloria is acquired by suppression of the spur: thus in the columbine, which has normally five spurs, each petal being "calcarate," they may be all suppressed; and so the flower, though still "regular," as all the petals are alike in both cases, has only ordinary flat petals, as in its ally the buttercup. This kind is, therefore, due to atavism. Hence what is called a sport in *Linaria* is the normal condition of the columbine.

Dialysis.—Many other kinds of sports occur, such as the separation of the petals of a gamopetalous corolla. This may be an accidental sport, as sometimes occurs in *Convolvulus*, &c.; or it may be perpetuated, as was the case with the hair-bell, *Campanula rotundifolia*.

Fruit-sports.—These are very common. Thus in the *Cucurbitaceæ* the fruits take a great variety of forms: an illustration‡ of the bottle-gourd (*Lagenaria vulgaris*) shows three forms on one plant—the "bottle," an elongated, cucumber-like fruit, and an oval one. Again, globular and long fruits of cucumber may occur on the same plant. One of the most remarkable cases is that of the nectarine, which originated as a sport on a peach. It is not infrequent for both fruits to appear on the same tree now, and sometimes a fruit will have half its skin woolly, the other half smooth. As the peach is a result of change in an almond, when the stones are sown it is impossible to foresee which of the three kinds of trees may result. The strawberry and tomato often bear multiform fruits.

Dissociation.—Though the results of this are often regarded as sports, yet they ought to be distinct, as it is simply a hybrid or offspring of a cross between two differently formed parents, which suddenly produces as distinct the foliage, flowers, or fruits of each of the two parents respectively. Thus a hybrid hellebore has borne pure white as well as purple flowers on distinct stems arising from the same root-stock. Garden petunias are often striped white and purple; thus they betray their hybrid origin from the two original species, one of which bore purple flowers, the other white ones. A chrysanthemum may develop a flower half red and half yellow. Orchids, too, not infrequently have the sepals or petals half of one colour, the other half white, &c. The cause of dissociation is quite unknown, but it may become permanent, as in the petunia, York and Lancaster rose

* See *Origin of Floral Structure*, p. 303.

† Danielis Rudbergi Vermelandi "Dissertatio Botanica de Peloria" (with pl.), *Amœn. Acad. Bot.*, 1744, p. 280. But Linnæus, in the *Species Plantarum*, 1764, refers to *Peloria* as "*Linariæ proles hybrida . . . naturæ prodigium*." *Amœn. Acad.* i. p. 55, t. 3.

‡ Occurring in Matthioli's Commentary on Dioscorides, 1560.

(probably), and *Cytisus Adami*, which bears yellow, rose, and brick-red coloured flowers on one and the same tree.

The general conclusion arrived at by a study of bud variations is that while in the majority of cases the actual and immediate cause cannot be more than approximately surmised, yet they may become hereditary, though in the majority of cases they seem only capable of being perpetuated by means of vegetative propagation. Moreover, they may, and often readily do, revert to the original character, so that it frequently happens that green-leaved shoots are seen to occur on variegated shrubs. While the colours of garden flowers which have originated as sports are very capricious when seed is sown, as in sweet-peas, pansies, &c., yet, if they can be propagated by cuttings, then they may—but not always—be depended upon, as in chrysanthemums and roses

BANANAS FROM A COMMERCIAL POINT OF VIEW.

By MR. FRANK PINK.

[Lecture given on March 28, 1905.]

It is probable that an article dealing exclusively with the production of bananas would have greater interest for the members of the Royal Horticultural Society than the subject on which I am writing; but as most of the bananas cultivated are intended to be sold in the ordinary markets of the world, some information about the methods of handling and disposing of the fruit may be appreciated.

The banana has been known for centuries, but it is only during recent years that it has found its way to this country. Some years ago, a gentleman staying in the Canary Islands for the benefit of his health saw the fruit growing, and was struck with the possibility of shipping it to England. He approached the shipping companies, who then used the islands as a coaling station; at first they would not consider the matter, but later they agreed to try some experimental shipments. Many failures occurred in the early stages of the industry; but a sound trade was founded, which has been of immense benefit to the islands, and of great value to our shipping companies.

Until about four years ago, the monopoly of the banana business was held by the Canary Islands, when Sir Daniel (then Dr.) Morris, the Imperial Commissioner of Agriculture for the West Indies, induced the Government to offer a subsidy for a direct line of steamers to run to and from Jamaica, and to bring over every fortnight not less than 20,000 bunches of bananas.

A contract was entered into with Sir Alfred Jones, the chairman of the Elder-Dempster Line, and the importation of Jamaica bananas commenced. At the time it was thought that the industry of the Canary Islands would be seriously damaged, but methods there have been improved, and the public demand for the fruit has increased to such an extent that I think I may correctly state that the Canary industry is now as flourishing as ever it was.

Soon after the direct Jamaica service was established, the Royal Mail Steam Packet Company, which for many years has run steamers to the West Indies, took steps to render its vessels capable of carrying bananas, and it has been possible to open up the industry in Barbados, and also to make experiments in Trinidad, St. Vincent, and British Guiana. It can easily, therefore, be seen how the business has increased during the short period of four years, and how it is now no longer confined to one country.

I will now say a few words about the kinds of bananas which can be sent to this country. That grown in the Canary Islands is the *Musa Cavendishii*, which bears large compact bunches of moderately large "fingers," and attains a height of about ten or twelve feet.

The plants are fairly hardy, but the fruit is very delicate, and, in spite of its thick skin, is very sensitive to bruising or low temperatures, in consequence of which it is always shipped carefully packed in crates. In flavour it is rich, and is generally preferred to other kinds.

This kind is also grown in Barbados, but there it attains greater perfection, and is of finer flavour and more luscious, probably owing to the soil being richer than that of the Canary Islands.

The variety grown in Costa Rica and Jamaica is the 'Gros Michael,' the plants of which attain a height of eighteen or twenty feet, and bear long straggling bunches of large fingers, which are much coarser in flavour than those of *M. Cavendishii*. The plants are less robust than those of the smaller variety, but the fruit is much more hardy, and will stand a lot of knocking about, and a moderate amount of cold, for which reason the bunches are always shipped without packing. This is fortunate, for the long bunches require very cumbersome crates to pack them in.

Another kind sometimes seen here is the 'Claret,' which derives its name from the dusky claret colour of its skin, and which, in my opinion, is the best of all, having a very delicious flavour. The bunches are usually very small, and have very few fingers on them, but these, being very large, are well worth the price usually charged for them, 2d. each. It is possible that this kind may become better known before long.

Of kinds which are useless for export there are several; and I have often been asked why one, the 'Lady's Finger,' is not sent over.

The reason is that the bunches and the "fingers" of this variety are very small, and the skin of the fruit is so delicate that it is almost impossible to "market" this banana in good condition.

It is frequently stated that the large fruit seen on the hawkers' barrows, and in the shops, is not the true banana, but the plantain.

This is incorrect, for the plantain is quite a distinct variety, and is generally used as a vegetable. I have never heard of any being sold here.

The banana is very easily grown, and produces a larger quantity of food per acre than any other plant known, for with ordinary cultivation one acre will produce from two to three hundred bunches, at a cost of only about £4 or £5; therefore one would think that it should be possible to buy very cheaply here; but unfortunately, although one of the easiest grown fruits, it is one of the most difficult to transport, and the freight usually costs four or five times as much as its cultivation.

From the Canary Islands the voyage takes from five to seven days, and the fruit is brought as deck cargo, no special facilities being provided to keep it cool in summer or warm in winter, so that in both seasons large quantities are spoilt.

The voyage from Barbados takes from eleven to twelve days, and the fruit is brought in holds cooled by powerful fans, and in some of the ships by refrigerating machinery. The percentage of waste from all causes is steadily decreasing, and large consignments often arrive now with every bunch absolutely sound. Last year three or four consignments were spoilt by overheating, and this winter one consignment has arrived badly chilled.

As the temperature of the holds must not go above 70 degrees for any

length of time, nor below 55 degrees at all, it can easily be seen that the question of transport is a difficult one.

From Jamaica the voyage takes about twelve or fourteen days, and from Costa Rica three days longer, and all the fruit is brought in special chambers cooled by refrigerating machinery of the latest type. In spite of this, cargoes sometimes arrive dead ripe, and sometimes nearly the whole of a consignment has had to be thrown overboard.

The steamers specially fitted with the cooling machinery can bring from 85,000 to 45,000 bunches on each voyage.

A source of considerable loss in the smaller islands of the West Indies, and in British Guiana, is the fact that shipments can only be made once a fortnight, many bunches in the intervening days ripening, and having to be sold locally for any price obtainable.

The methods of collecting and shipping the fruit vary considerably, and I will explain how this important work is carried out.

In the Canary Islands, the growers very rarely ship on their own account, but sell to native merchants, or the buyers of English firms, who either sell on their own account to English importers, or send the fruit to be sold on commission. The man who buys the fruit takes all risks, and packs it himself. The question of shipping is not difficult, for steamers are calling almost daily.

In Jamaica the bulk of the fruit, and I think I may say all that is sent to this country, is bought from the growers by the American Trust.

It is taken to the ship by railway or road, and the bunches are paid for according to size. The same method is in vogue in Costa Rica, where the Trust is also in control. From both places the riper fruit goes to the States, and the less mature comes here.

From British Guiana, St. Vincent and Trinidad, small shipments have been made by individual merchants or growers.

In Barbados the best and most economical system of all is employed. The grower packs his own fruit, marks the crates with the distinguishing number of his estate, and carts it to the capital Bridgetown, where he hands it over to the Imperial Department of Agriculture, after which he has no more to do with it. The officers of the department examine every crate, and also measure it, to ascertain the amount to be charged for freight; and the whole of the fruit sent in is shipped as one consignment to one firm at Plymouth, to be sold on commission.

The quantity shipped is advised by cable, and arrangements are made at Plymouth to land the quantity required there, and any surplus goes on to Southampton, and is either sold there or sent to other towns where there are good markets. When the consignments are sold, an account is made out for each shipper, all the accounts are sent to the Imperial Department, with one remittance, and the accounts are sent to the growers, and payments made to them by the Department.

It is interesting to note that at present every grower in the island ships in this way. All intermediate profits are eliminated, and the grower gets more for his fruit, although it can be sold cheaply to the shopkeeper. The consignments being all in the hands of one firm, useless competition does not occur; and they can be so regulated, in accordance with the demand, that losses from glutted markets are unknown.

I will conclude my paper with a short description of the manner in which the fruit is handled in this country.

For all kinds of bananas, specially constructed rooms are required, in which the temperature can be easily regulated; for in the winter the fruit must be kept warm, and in the summer it must be kept cool, or it will ripen too quickly. If the bunches are not packed, they are usually taken from the ship and placed in railway trucks immediately, a little straw being placed between them to prevent bruising; they are then consigned to the wholesale dealers who distribute them.

These dealers usually keep them in special rooms, and also ripen them. The "crated" bananas are usually ripened by the importers, and sent out when nearly ready for consumption.

The Barbados fruit is probably handled as economically as any, for on the arrival of the steamers at Plymouth it is placed in lighters which take it direct to the quay on which the stores are situated. From the lighters it is taken direct into the special rooms, without any cartage or other delay being necessary. It is then examined, and the best bunches marked with the registered trade mark 'Dagger Brand,' by which it can be distinguished from other kinds. When nearly ready for consumption, it is sent to the shopkeepers.

A large amount of doubt seems to exist as to the correct state of ripeness to which a banana should be allowed to go before consumption.

I think the fruit is not by any means perfect until brown spots begin to show on the skin, at which stage every trace of green will have disappeared. These brown spots due to ripeness are quite easily distinguished from marks caused by bruises.

The shopkeeper usually prefers to send the fruit out before it reaches this stage, and I think he is quite right to do so; for when it is really ripe it becomes very soft, and is really not in a condition to bear the ordinary handling necessary. It is better for the consumer to have it delivered in a firm condition, and to complete the ripening at home, than to have it delivered badly smashed. An "expert," writing to one of the medical papers a short time ago, accused the shopkeeper of ignorance about bananas, and expressed the opinion that the fruit should be sent out fully ripe.

When buying bananas, one often wishes to know which kind is being offered, and this can easily be determined, for the 'Gros Michael' variety has long "fingers," with strongly marked ribs, and pointed ends.

The *Cavendishii* variety has plump "fingers" with rounded ends, to which little tufts of cotton wool are usually adhering.

To tell the difference between Canary and Barbados fruit is not so easy, for to outward appearance there is little difference; in fact, to any one but an expert, no difference.

JAPANESE PLANTS AND GARDENS.

By R. FARRER, F.R.H.S.

[Lecture given on May 9, 1905.]

THE English lover of flowers is confronted at the outset with a grave difficulty when he comes to consider the question of Japanese horticulture. For the Japanese look upon flowers and gardens from an entirely opposite standpoint to our own. To a Japanese the plants exist for the garden, not the garden for the plants. A Japanese garden is designed solely as an imitation of landscape—it is a matter of rockwork, perspective, and careful artifice. In fact, Japanese gardening is rather an architectural than a cultural art. Many, abstruse, occult, and minute are the ritual rules, the artistic canons, the inner symbolism that rigidly govern the correct placing of every rock and stone in a well-built Japanese garden. But among these rules, those dealing with the beauty and comfort of plants are rarely if ever consulted. The gardener is of little use as a grower of normal plants in their normal conditions, as such are not required for his purpose. On the other hand, he is unsurpassable when it comes to torturing and maiming some little bush into the prescribed canonical shape for the position that it is to occupy in the rockwork's perspective. This, of course, is not to say that a fine Japanese garden is not supremely beautiful and satisfying to the artistic sense; only its beauty is of a totally different nature, springing from totally different aims, and based on totally different methods from those that dictate the loveliness of an English flower-border: and the two beauties are so utterly unlike that no comparison can possibly be made between them.

Though the views of the Japanese gardeners as regards the selection and proper manner of growth of plants are most artificial, the Japanese have, as is well known, their favourite flowers, such as *Wistaria multi-juga* and *Iris Kämpferi*—for whose successful treatment they recommend as sunny a position as possible combined with plenty of moisture, and liquid manure in the spring rather than a constant soaking with water.

English sentiment is too apt to assume that the Japanese love all flowers equally. This is far from being the case. They have, as I have shown, little artistic reverence for most flowers, and their real admiration is restrained to those plants that most invariably obey the canonical rules of curve and colour. The iris, cherry, peach, bamboo, magnolia, wistaria, azalea, camellia, ktus, plum, and pine are among the elect. But the rose and the lily, being unrefined flowers according to Japanese artistic laws, are more or less beyond the pale of horticultural tolerance. The favoured plants, even, are rarely allowed to appear in the garden proper: they are grown in beds at some distance from the elaborate landscape, so as not to interfere with its proportions. And yet, though the canons of art are thus stern, popular Japanese sentiment is busy with wild flowers. Even the rarer species have each their common name, and whereas it would be

hard to find in England a popular name for *Saxifraga oppositifolia* or *Gentiana verna*, any Japanese peasant will at once give their common name for *Schizocodon*, *Conandron*, or *Cypripedium*.

As so much has already been said on Japanese gardens, and as I myself am only a reverent admirer of the fine details of Japanese artistic symbolism, I will go straight to the subject of such wild plants as may be of value for cultivation in England. At first great difficulty seems to be presented by the difference between Japanese soil and climate and our own. Practically the whole of Japan—at least in Hondo and Hokkaido—is blessed with bottom-heat of volcanic nature. Further, the soil is very often of soft warm volcanic silts, enriched with abundance of vegetable humus. Further, the climate is very trying. The summer is intensely hot, and the winter even more intensely cold, and rain is practically persistent throughout the year. This combination will show at once what difficulties may be expected to occur in the acclimatisation of such plants in our own climate, where the summer heat is incapable of giving the plants sufficient power to resist the chilly damps of winter, so different from the icy frosts of the Tokio plain, and where our heavy soil is powerless for the most part to carry off the heavy rainfall that clogs it. But the ambitious gardener need never be discouraged by anticipating improbabilities of success. No arguments are more uncertain than those based on the probable ease, or difficulty of culture of certain species. Plants behave in the most eccentric manner when introduced into gardens. It might have been expected that our native *Gentiana verna* would be very easily cultivated, yet, over a great part of England it fails hopelessly. It might, on the other hand, be anticipated that the high-alpine *Ranunculus glacialis* would prove impossible; yet in England it thrives without any difficulty. Therefore great hopes may be entertained that the more beautiful Japanese wild plants may be found amenable when introduced by means of seeds.

Though the Japanese landscape is rather disappointing to the flower-lover in its absence of bare and open spaces, yet there are many lovely species that one may see upon one's journeys. Some of them I have noted, with a few suggestions.

Lobelia radicans.—A vigorous and compact-growing plant, bearing large purple or rosy flowers in such abundance as to hide the foliage. The appearance of this species when in bloom is such as to recall some very floriferous dwarf linaria. It is quite common, but grows best in open humid places, such as the banks of an unshaded stream or pond. It flowers in early summer, and should prove of the greatest value for English bog-gardens. My own plants are very small as yet, so that I cannot claim to have given it any fair trial, but I anticipate little difficulty.

Lithospermum erythrorhizon.—A species allied to *purpureo-ceruleum*, but incomparably more brilliant. It is an inhabitant of thin coppes, where it produces its large flowers of the most dazzlingly pure azure blue in such abundance as to suggest a patch of fallen sky. This species has not yet, I believe, been successfully introduced into England. In old days, it was a "meibutsu" (especial glory) of the Tokio plain, and the inhabitants used to make pilgrimages from the city to adore it during the splendour of its

short flowering season. Like *Lobelia radioans* it should be easily introduced from seed.

Lysichiton kamschatcense.—A most majestic aroid, akin to *Symplocarpus*, and distributed widely in very marshy places throughout Northern Japan, the adjacent continent, and North-Western Canada. The flowers are produced almost stemless before the leaves, and are of the shape, size, and colour of *Calla æthiopica*. After their decay the plant sends up a sheaf of immense leaves, recalling the foliage of *Musa Ensete*, though borne only upon short stems. This species is undoubtedly hardy, and will certainly be the glory of our bog-gardens when introduced. My own plants all died of the heat in Central Japan before I could take steps to send them across.

Rhododendron dilatatum.—Japanese rhododendrons of the *Azalea* section are so numerous as to present great difficulties of identification. Nor are they well represented in the Shoufou and the Sokou Soussets. But the species I am about to describe appears closest to *R. dilatatum*. Despite its most astonishing beauty, it has never come into general culture. The plant is an alpine species, being found on the mountains behind Nikko, between 3,000 and 3,500 feet, keeping most strictly to that level, so that it makes a solid and regular band of colour upon the mountain-sides, and a cap to the lesser hills. It grows in loose vegetable soil, and appears to enjoy thrusting its roots among the rocks. It has never been found possible to cultivate this plant at lower and warmer levels in Japan. It forms a loose-growing shrub, after the habit of *Corylus Avellana*, reaching a maximum height of ten or twelve feet. The flowers appear before the leaves, and are not produced in any great number until the plant has reached a certain age and size. They are borne in pairs on very distinct pedicels, and present a lovely contrast to the silver whiteness of the bark. They are very large in size, campanulate, unspotted, and of the most brilliant soft rose colour, which has none of the brassy or purple tint that so often appears in other species, but is of so absolutely pure a pink that from a distance one naturally mistakes the shrub for some wild peach or cherry of rich colour. If this plant can ever be introduced into cultivation, it would soon take rank among the most beautiful of shrubs, its love of cool air and high elevations giving good hope that it would be satisfied with our English climate.

Cypripedium macranthum ventricosum.—This species is not sufficiently known. To my mind it is by far the most beautiful of all the cypripediums, hardy or hothouse. Its colour is more intense than that of *spectabile*, and its whole appearance is infinitely more noble. The flowers are larger, the petals and dorsal sepal long and pointed, sweeping away from the lip in finely waving curves that make its whole aspect far more dignified and refined than that of the rather dumpy-blossomed *spectabile*. The plant is found all over the higher downs of Japan, as for instance over the open spaces round the feet of Fuji-yama. It luxuriates in very loose and fine volcanico-vegetable soil, and in a light friable loam, and with abundant drainage should prove a valuable introduction into general English culture. Albino and biflowered specimens occur, though rarely, and the plant is a varietal form of the Asiatic *C. macranthum*.

Conandron ramondoides is a fairly well-known plant by now, though its culture is hedged round by a supposed difficulty. It grows in shady crannies of the rocks at moderate elevations, and continues to spread over the surface of the cliff after the manner of a *Ficus*, seeming to demand no further sustenance than that of the bare stone, till at last, as at Kamakura, it forms a solid uniform curtain across the precipice. Sunshine and surface-moisture must be avoided. The plant, if moved at the proper time, should prove quite hardy.

Dendrobium moniliforme.—A very pretty little white-flowered dendrobe which succeeds well in England as a perfectly hardy terrestrial orchid, if accorded the precise soil and dry, shaded situation demanded by *Jankaea Heldreichii*.

Angracum falcatum will probably require the same treatment.

Anemone cernua has been exhibited before the R.H.S. The common Japanese anemone, it is a worthless plant, being a dingy-coloured species, nearly allied to *pratensis*.

Daphne Genkwa and *D. odora variegata* are both rare and beautiful plants, which, if imported from the frost-ridden plain of Tokio, I have found to be perfectly hardy and satisfactory in cultivation, though *D. Genkwa* is a native of the warmer parts of Southern Japan and China.

Camellia japonica reaches great dimensions in Japan, and offers every indication of hardiness. It might almost be employed in England as a forest tree, in good soil and a sheltered yet sunny woodland situation. It presents a very glowing aspect when crowded with its enormous single flowers of ruby red.

Camellia Sasanqua.—This exquisite shrub has caused some disappointment over here from defective knowledge of its habits. It is *never* a tall nor a robust shrub, but invariably slender and straggling in growth, forming a loose-growing little bush of three feet or so in height, from which is thrown up one or more tall and graceful growths perhaps six or seven feet in height. The large single flowers, like big beautiful dog-roses, are borne abundantly in October and November. My own plants are happily in perfect health.

Schizocodon soldanelloides.—Much of the difficulty attending the culture of this species is owing to the fact that well-rooted plants are so rarely sent over. The *schizocodon* is a typical Japanese alpine, being found only at very high elevations, in company with *Diapensia lapponica* and *Primula Reidii*. Its Japanese name is 'Iwa-kagami,' or 'Mountain-mirror,' the shape of its leaves resembling that of the Japanese kagami, or mirror. (The prefix 'Iwa' almost invariably denotes an alpine, as 'Iwa-Tabako' for 'Conandron,' 'Iwa-sakura,' 'rock cherry,' for *Primula* and *Androsace* indiscriminately.) I never saw the *schizocodon in situ*, but one evening, attending one of the Japanese night-fairs in the streets of the capital, I saw the plant offered for sale in a miniature garden, and at once ordered two hundred specimens to be sent to my house. The next day the two hundred arrived, robust as cabbages, thus showing that Japanese nurseries experience no difficulty in its culture. But alas! they were sent down to Yokohama to be nursed awhile, previous to departure, and in the torrid heats of that pestilential place they all died. No one who has only seen the poor blossoms which the plant bears over here can have any conception

of its very charming loveliness when the strong stems rise well above the rounded glossy leaves, bearing a loose panicle of their large rosy bells more beautifully fringed than those of soldanella. Given sound plants, the culture of *schizocodon* should not be hopeless, in soils and aspects favourable to galax and shortia. Of *Schizocodon ilicifolius* little seems to be known, and I have never penetrated to the haunts of *Shortia uniflora*, though I was shown a forest far away on the lower slopes of Fuji-yama, within whose impenetrable fastnesses the plant was to be found in a clearing of the jungle.

Calanthe japonica.—This terrestrial orchid occurs in three forms in Japan—white, yellow, and pink. It is found among the brushwood on hillsides, but though interesting is hardly beautiful enough to give much satisfaction to English gardeners.

Taraxacum (?) *dens leonis*.—Tokio is filled with a weed absolutely indistinguishable from the common dandelion, but producing white instead of yellow flowers. The yellow form, curiously enough, does not occur.

Pyrus japonica prostrata is a creeping variety of universal occurrence, bearing the usual large flowers of dazzling crimson, but absolutely prostrate in habit. It is a most delightful creeper.

Iris tectorum.—This plant is usually considered of very doubtful hardiness. But in North-West Yorkshire, in a chilly and damp winter atmosphere, clumps of this species planted in the level open ground, with no protection whatever, have successfully withstood all climatic conditions. I attribute their hardiness to the fact that they were imported from the coldest parts of the ice-bound Tokio plain. The extreme beauty of *tectorum* needs no recommendation.

Iris gracilipes has at last been successfully introduced, though its hardiness is regarded with suspicion and its treatment as not yet certain. To my mind this little species is perhaps the most beautiful of all cultivated irises. It is of dwarf and slow growth, forming small clumps, whence sprout the graceful grassy little leaves. Well above them, on very delicate, slight stems, are borne three or four blossoms, recalling those of *I. jimbriata* in shape and colour, but smaller in size, and far more brilliant in the deeper blue of the flower and the rich gold of the beard. I had heard of the plant and even seen it in cultivation, but its full beauty was only revealed to me one day when I came upon it growing by thousands in a clearing of a copse far up on the coast of Northern Japan. The low tangled underwood had been cleared the year before, as hazel copses are cleared in England. All over the slope of the clearing *Iris gracilipes* was growing as abundantly as primroses in an English clearing. In the adjacent wood not a plant was to be seen. The slope faced towards the north, and the soil was pure vegetable mould and humus. The plant obviously required abundant light and air, and was ready to confront the full cold of a North Japanese winter. Good drainage and a warm light soil should cause this exquisite little plant to be perfectly hardy and robust. No introduction could possibly be of greater value to our rock-gardens.

Time would fail me if I were to tell of all the many other species which I came across in the course of my wanderings. But I think I

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have enumerated the more strikingly beautiful ones which may some day be found of great interest in our gardens. The flora of Japan is more or less essentially a woodland flora. Even up to ten thousand feet on Ontaké San low scrub of *Leucothoë* and *Andromeda* is found. Therefore it may well be imagined that the larger proportion of plants seen by the wanderer in Japan belong to the sylvan class. Many species of *Arum*, *Asarum*, *Arisæma*, and *Arisarum* abound. *Aquilegia ecalcarata* and *A. flabellata* are attractive species that frequently occur. *Anemonopsis* is only a southern plant, but anemones are abundant all over the country, from the big dingy *cernua* and graceful *dichotoma* to the minute *flaccida* and *Raddeana*. Several species of *Coptis* occupy shady woods, where *Schizophragma* creeps about everywhere, and *Pyrola uniflora* occasionally occurs. The genus *Primula* is represented rather more often by *Sieboldi* than *japonica*; iris by *sibirica*; campanula by *C. punctata* and *platycodon*. Though very many Japanese plants are unsuitable to cultivation over here, and of little more than botanical interest, there are no doubt many lovely plants that have yet to be introduced which will certainly prove of great value and interest in our gardens, and I shall be very glad if the few suggestions I have made are in any way useful in directing the attention of horticulturists to them.

JAPANESE HORTICULTURE.

By N. HAYASHI.

[Lecture given on May 9, 1905.]

BEFORE going into technical details, I shall venture to give an outline of the history of the subject of the lecture. As is well known, although my nation is one of the oldest now in existence, 2,566 years having passed since the first Emperor's accession to the throne, yet the fact of her complete isolation from the Western world prevented her from profiting by the advance in civilisation of that part of the earth, and thus she was compelled to continue to look to China as her teacher, and Chinese civilisation as her model, until the revolution and subsequent opening of the country to Western influences and civilisation some fifty years ago. In such circumstances, horticulture also was developed on Chinese principles and bound by Chinese conventional rules. The progress of horticulture, however, depended on the tranquillity of the country; and indeed, until Shogun Tokugawa, the great feudal ruler, had brought about universal peace by the construction of a powerful government in A.D. 1595, the art of horticulture did not make any marked development. From this time, down to the end of the eighteenth century, the warriors as well as commoners began to devote themselves to peaceful arts and naturally to turn their eyes to gardening. The result was that we, even at the present time, regard the Tokugawa dynasty as the golden age of Japanese horticulture. But there came another civil war, or, more correctly speaking, a revolution, about forty years ago. The object of the revolutionists, who were not revolutionists in a bad sense, but reformers, was to effect a complete change in the old customs which appeared to them to be impediments in the path of obtaining Western civilisation. Thus the beautiful gardens attached to the town houses of feudal lords and Shogun's knights in Yedo (now Tokyo), the then seat of the defeated Shogun, were remorselessly destroyed; trees and bushes were cut down and converted into fuel for the people's furnace, and ornamental stones were dug up to pave the streets. In these circumstances it is no great wonder that the art of horticulture was for a while entirely suppressed.

The time has not yet come, however, for the nation's undisturbed devotion to such a peaceful art to the extent that we desire. The civil war, fortunately enough, ended in a comparatively short time, and perfect peace was restored. But by that time Japan had started a new life, and the whole of the people, fully realising the vital necessity, were bent on making their country the equal in civilisation, and in powers of defence and offence, of any European nation: education, law-making, military organisation, and hundreds of other necessary alterations due to the sudden change to Western civilisation urgently required attention. Consequently, though the cultivation of utilitarian fruits and vegetables has been more or less encouraged by the Government, the cultivation of garden plants

and flowers has not much occupied the people's attention. Moreover, only ten years after the last Chino-Japanese war, we have been again called upon to fight against a certain Power for our national existence as well as for securing permanent peace in the Far East. And we have not, for this reason (which, I trust, will evoke your warm sympathy), been able to do as much as we should wish for the cultivation of this peaceful art; but I sincerely hope the conclusion of this terrible war will bring the much-desired peace in the East, in which case our horticulture will not be slow in benefiting by it.

To avoid misunderstanding on the part of my audience, I must mention the locality in which I have been engaged in this art, as Japan, which stretches over many degrees of latitude, greatly varies in its climate. In the course of my lecture, if I do not particularly mention the name of the district, it will be understood to be Tokyo where I was working.

Horticulture in Japan is not yet treated as a different subject from agriculture, and it forms a branch of that science. The most advanced course of study is provided at the Imperial University in Tokyo, and below this there are three schools—one being under the direct supervision of the above University, and the others are under the Sapporo and Iwate prefecture in the northern part of Japan. I may also add that to complete the University education takes nineteen years, starting from the elementary school at the age of six. The term of education at the second-grade school is sixteen years (including the boys' school). Besides the above mentioned there are about thirty agricultural schools throughout the country, chiefly of a practical nature, and in those the term of study is eleven or twelve years, according to the different districts. Large experimental grounds for agricultural purposes, including horticulture, are provided in six districts under the direct management of the Government, the one at Tokyo being the largest. But I am glad to say that a new experimental ground was opened the year before last in the Shizuoka prefecture. Besides these, many districts have their own grounds on a small scale, supported by the local rates. As regards private undertakings, with a view to promote an interest in agriculture, there are several organised bodies, one of which is the "Agricultural Society of Japan," with its head office at Tokyo. These societies occasionally hold shows of vegetables and fruit. In addition to the numerous agricultural societies throughout the country, there is one organised body, called "Nihon Engai Kai" (Japan Horticultural Society), which is solely interested in horticulture. Also there are various societies of different character, chiefly consisting of dealers in certain flowers and plants, which are generally concerned with one species of plant or flower. The kinds of plants and flowers which constitute the objects of these Societies are as follows:—

Kiku	<i>Chrysanthemum sinense</i>
Asagao	<i>Pharbitis hederacea</i>
Ran	<i>Cymbidium ensifolium</i>
Omoto	<i>Rhodes japonica</i>
Sakuraso	<i>Primula farinosa</i>
Bara	<i>Rosa indica.</i>

Besides these, there are some societies similar to the above in their character, respectively called the "Fruit Society," the "Dwarf Tree Society," and "Ikebana Koi." In the last named, "Ikebana" is a term applied to a system by which flowers and plants are to be treated and arranged in the flower vases. The "Ikebana" is one of the valuable remnants of old Japan, and is regarded as a branch of æsthetical training especially for women. Flowers and plants for decorative purposes in Japanese rooms must almost necessarily be those which are treated and arranged in accordance with the system of "Ikebana." There are several schools concerned in carrying out these methods and principles. These different schools often show in competition, which excites no small interest among ladies and other interested persons. It is becoming the fashion now even in a banquet, otherwise entirely in Western style, to have the tables decorated with flowers and plants according to the rules of "Ikebana."

Now, upon entering the technical part of my lecture, I will begin with the vegetables. As you doubtless already know, the "staff of life" in Japan is rice, and consequently our cooking of the vegetables which constitute the sub-food differs greatly from yours. Japan has cultivated vegetables for a very long time, and has produced a great many garden varieties of them. In addition to this, owing to our now eating more animal food than we did before, many new vegetables of foreign origin have been introduced. I will now deal with some of the principal ones.

1. VEGETABLES.

Bulbous and Tuberous-rooted Vegetables.

Tamanegi (*Allium cepa*).—The onion is not a native of Japan, but was imported from England, France, and America after the Reformation. And now good onions are produced in Hokkaido and Kinai, and some are being exported. They are now so commonly used that you will find them in the ordinary grocers' shops in Tokyo.

Jagaimo (*Solanum tuberosum*).—The potato had been more or less used in the time of old Japan; there are a few native varieties, but they are not so good as the imported ones, and some of them are disappearing as the result of natural selection. The potato is seldom eaten by Japanese, and in Hokkaido a large proportion of the crop is consumed in making alcohol.

Fudanso (*Beta vulgaris*).—Beetroot is not of Japanese origin, and as its taste does not seem to suit the people it is not much cultivated.

Ninjin (*Daucus carota*).—The carrot has been widely cultivated and used in Japan; there are many native varieties. One species is so large that the root measures two feet and a half in length and two inches in diameter.

Kabu (*Brassica Rapa*).—The turnip has been abundant throughout the country from the earliest time, and there are many native varieties. The majority of these are white-skinned, but one variety, produced in the southern part of Japan, is purple. The largest kind is 'Shogoin Kabu' (Kyoto origin), the diameter of which is over one foot. It is sometimes eaten boiled, but it is more frequently pickled.

Shiro-Ninjin (*Pastinaca sativa*).—The parsnip is not a native of Japan and is very rarely eaten.

Daikon (*Raphanus sativus*).—The radish has been very widely cultivated throughout the country since time immemorial, and the quantity produced exceeds that of any other vegetable; there are very many varieties. The crops of ordinary kinds are taken in the autumn, but others in the spring or the summer, and some are biennial. Of the ordinary kinds the largest are produced in Sakurajima Island, south of Kyūshū; they are about two feet in diameter and weigh five stones; some are more than four feet in length. This vegetable is chiefly eaten pickled or boiled. The imported radish is not much cultivated.

Yugobou (*Arctium Lappa*).—The burdock has long been cultivated, and there are many varieties; it is eaten boiled.

Satsumaimo (*Ipomoea Batatas*) has been long used as the potato is in the West, and is most popular with the female sex; there are some fifty or sixty varieties, some red-skinned, and some white or yellow. It is eaten boiled, and widely used as an ingredient for cakes.

Oniyuri (*Lilium tigrinum*), the Tiger lily.—The bulb of this vegetable is used in Japan in cookery in various ways, and is sometimes made into flour; it is produced more or less throughout the country. In England it seems to me that it is cultivated simply for producing decorative flowers; similarly in Japan cherry trees are cultivated with little regard for the edible properties of the fruit, but with the view of obtaining large quantities of blossom.

Hasu (*Nelumbium speciosum*), the Lotus or Sacred lily.—This subaqueous root is eaten in Japan and constitutes one of the most important vegetables. In the West it appears to be another example of an edible plant being cultivated solely for decorative purposes.

Chyrogī (*Stachys Sieboldi*).—The hedge nettle is cultivated in Japan merely for making pickles.

Kuwai (*Sagittaria sagittæfolia*).—The arrowhead is much eaten, and is grown in marshy ground. There are many varieties.

Kikuimo (*Helianthus tuberosus*).—The Jerusalem artichoke has been recently imported and is not much cultivated.

Yamaimo (*Dioscorea Batatas*).—The yam grows wild, and is cultivated in gardens as well. There are many varieties.

Haramonshin (*Tragopogon porrifolius*), the vegetable oyster, and *Kikugobo* (*Scorzonera hispanica*) are of recent import and not used in Japanese cookery.

Satoimo (*Colocasia antiquorum*).—The cocoa root has long been cultivated in Japan, and the leaves of some species can be eaten. In this country the genus is represented by stove herbaceous plants, but I do not think its root is used in cookery.

Rakkyo (*Allium Bakeri*).—Garlic is cultivated for pickles in the same way as young onions in this country.

2. VEGETABLES WITH EDIBLE LEAVES, STALKS, OR FLOWERS.

Oranda kijikakushi (*Asparagus officinalis*).—Asparagus has been imported since the Reformation and is gradually becoming more popular.

Habotan (*Brassica oleracea*).—The cabbage, though an imported vegetable, is now cultivated in a great many parts of the country; it seems to be acclimatised more readily in the northern part of Japan.

Komochi Habotan (*Brassica oleracea gemmifera*).—Brussels sprouts are not much cultivated yet.

Santosai (*Sinapis chinensis*).—Shantog cabbage has been imported from China and is cultivated in many districts; it would appear to be more generally eaten than the other cabbage. There are also many other Cruciferous plants of which the leaves are used as food.

Fuki (*Petasites japonicus*) has been cultivated from time immemorial and is widely used. It is more easily grown in a cold country, and some plants grown under cool conditions have stalks about 8 feet long and leaves 4 feet wide.

Seri (*Enanthe stolonifera*).—The water dropwort, which grows in marshy ground, has a delightful flavour. In some districts the wild species is eaten, but in the neighbourhood of Tokyo it is cultivated in gardens.

Sugina (*Equisetum arvense*).—The horse-tail is cultivated for the sake of the flower, which is at the best in the early spring.

Shungiku (*Chrysanthemum coronarium*) has been cultivated for ages, and its leaves and stalks are eaten both raw and half boiled.

Ryorigiku (*Chrysanthemum sinense* var.) is cultivated for the flowers, which are eaten in salad.

Moso (*Phyllostachys mitis*).—This bamboo, which is the largest indigenous species, grows to a height of 30 or 40 feet. Its shoots are considered a great delicacy. They are dug up in the early spring, when they have made their appearance a few inches above the ground. It is found all over the country.

Oranda Mitsuha (*Apium graveolens*).—Celery has been recently introduced, but is not used to any great extent.

Chisa (*Lactuca sativa*), Lettuce.—Both the imported and native kinds are cultivated in various districts.

Horenso (*Spinacia oleracea*).—Spinach has been long cultivated, especially in the neighbourhood of Tokyo.

Mitsuha (*Cryptotania japonica*) is chiefly cultivated in Tokyo and has a palatable flavour.

Wudo (*Aralia cordata*).—The angelica tree is one of the chief vegetables used in winter. It is cultivated and used in the same way as asparagus is in the West.

Negi (*Allium fistulosum*), Garlic var., is obtainable at all seasons, and forms an important condiment with Japanese diet. Near Tokyo its cultivation is so perfect that its white, fleshy, thick stalks attain the length of about two feet. As it has long been cultivated, there are many varieties.

Shiso (*Perilla arguta*).—Perilla is cultivated in every part of the country. Both the leaves and seeds are used for flavouring, especially for giving a necessary flavour to plums when preserved.

Besides the above-mentioned, there are many imported vegetables belonging to this genus, but I will here simply give the names of those which are natives of Japan :

Matsuna (*Salsola asparagoides*), Saltwort.
Okahijiki (*Salsola soda*), Saltwort var.
Yosai (*Convolvulus* sp.), Bindweed.
Tsuruna (*Tetragonia expansa*), New Zealand Spinach.
Karashina (*Sinapis cernua*), Mustard var.
Takana (*Sinapis integrifolia*), Mustard var.
Mizuna (*Brassia japonica*).
Myoga (*Zingiber Mioga*), Ginger var.

8. PLANTS GROWN FOR THEIR FRUITS.

Makuwauri (*Cucumis Melo*).—The melon has been extensively cultivated out of doors, but it seems to me that it is inferior in taste to the Western kinds which are grown under glass.

Kiuri (*Cucumis sativa*).—The cucumber has been cultivated for a long time and constitutes one of the best summer esculents; when grown out of doors its quality is probably inferior to those grown under glass.

Akanasu (*Lycopersicum esculentum*).—The tomato was introduced after the revolution and is cultivated to a small extent.

Ingenmame (*Phaseolus vulgaris*).—The French bean has been extensively cultivated for ages, and is one of the summer vegetables. Some American varieties are now largely cultivated in Hokkaido and furnish a large supply for cake-making. But some of the French kind can be found in places.

Endo (*Pisum sativum*).—The pea has long been cultivated and is used as an ingredient for making cakes.

Sora Mame (*Vicia Faba*).—The broad bean has also been cultivated for years, and there are many varieties, some of which are much superior to those of other countries.

Nasu (*Solanum Melongena*).—The egg plant is an imported vegetable, and is produced in large quantities for summer consumption throughout the country. Some varieties introduced from China have been greatly improved.

Tonasu (*Cucurbita moschata*).—This gourd is extensively cultivated, and differs greatly from the English gourd (vegetable marrow?) in its shape and in its possessing a sweet taste; it is popular among women, and can be kept for a long time.

Suika (*Cucurbita citrullus*).—The water melon is highly esteemed as a summer fruit, and many varieties are grown. But the native fruits are gradually being superseded by the superiority of the American fruit.

Shiro Uri (*Cucumis Conomon*), one of the cucumbers, is eaten either raw or pickled; the flesh is white and very much resembles the English cucumber; some large specimens are two feet in length and five inches in diameter.

Tsuru Raishi (*Momordica charantia*).—The male balsam apple has a peculiarly agreeable acidity when fried while it is young. It grows to a great length, sometimes three feet or more.

Togan (*Benincasa cerifera*).—The wax gourd is chiefly grown in the Tokyo neighbourhood, and is a favourite on the table.

Yugao (*Lagenaria vulgaris*).—The bottle gourd is mostly used after being thoroughly dried. The mode of drying consists in cutting the

flesh into very thin, long slices, in which state it can be kept for a considerable length of time.

Natamame (*Canavallia ensiformis*).—The horse bean is mainly cultivated for the sake of its hard pod, which is the largest of its kind among leguminous plants. It also is pickled.

Fuji Mame (*Dolichos cultratus*), a variety of horse bean, is also extensively grown.

Sasage (*Dolichos umbellatus*), another variety of horse bean.—The edible part of this plant is the young pod, which is sometimes three feet long.

Kibi (*Zea Mays*), Indian corn, is not much grown, though it has been in cultivation from olden times. New kinds are being introduced from England, France, and America.

4. VEGETABLES FOR FLAVOURING.

Orandazeri (*Apium Petroselinum*).—Parsley has only been recently introduced to the country, and is not used in Japanese cookery.

Togarashi (*Capsicum annum*).—Chili pepper is not a native of Japan, but was introduced by the Portuguese about the sixteenth century. It is now cultivated to a considerable extent. A certain variety which bears large fruit is often used as a decorative plant in pots on account of the bright red colour of its fruit. Another species called 'Taka-no-Tsume' is gathered when ripe, then dried; the dried fruits are largely exported. I believe the pepper used in this country is made to some extent from these varieties.

Shoga (*Zingiber officinale*).—Ginger has been known for generations; its young subterranean roots are eaten either raw or pickled, and are appreciated as a stimulant to the appetite. The dried roots are exported as a material for confectionery.

Ninniku (*Allium Scorodoprasum*).—This garlic is found in small quantities in Japan.

Wasabi Daikon (*Cochlearia Armoracia*).—The horse-radish was introduced not long ago, but as there is a similar plant, a native of Japan, which contains more pungent properties, it is not much used.

Wasabi (*Alliaria Wasabi* or *Sisymbrium*), hedge mustard, is the substitute for horse-radish. As this plant is only grown in shallow brooks among the mountains where the temperature does not change to any large extent throughout the year, and, moreover, as it requires water fresh from the springs, the localities for its cultivation are limited. The neighbourhood of the province of Tokyo Izu is noted for the excellency of its produce.

Tade (*Polygonum barbatum*).—The edible part of this plant is the leaf. In the Osaka locality it is propagated from seed and is grown by forcing.

Hamabofu (*Phellopterus littoralis*) is generally produced by forcing, and both leaves and stalks are edible.

FUNGI.

Yokin (*Agaricus campestris*), Mushrooms.—On account of the beds being manured with horse droppings, mushrooms are not much liked by the people. Their introduction is quite new.

Shiitake.—Dried mushrooms (*Agarics*) grown on either living or dead trunks of trees belonging to the Oak family are a very useful item in vegetarian diet; eaten boiled, either fresh or dried. The dried product forms an article of export to the continent of Asia.

Enokitake and *Shoro*, puff balls, belong to the same species. Among the edible fungi the favourite of the Japanese is *Matsudake* (*Armillaria edoides*), the flavour and taste of which are excellent. But it only occurs in a wild state in sandy pine woods.

This is a brief summary of the Japanese vegetables, but as the Japanese people do not take much animal food in the summer, owing to the heat, and prefer a light vegetarian diet, there are still many less important kinds of vegetables which have not been referred to in my list.

With regard to forcing, it has long been practised in a certain manner in the neighbourhood of large towns, but the old-fashioned methods are now gradually giving way to the European one, and, moreover, owing to the fact that the country has comparatively easy access to tropical regions (her own as well as foreign), and with the improved conditions of shipment, the need of forcing in general seems to diminish.

FRUIT.

The fruits of Japan are generally eaten raw, and never appear on the table with meals. A very few kinds are dried and crystallised for use. Jam making is quite a recent industry, learnt from abroad.

Nashi (*Pyrus sinensis*).—The Japanese pear, long cultivated in the country, differs greatly from the English one in its shape and properties. Though it has not so much flavour as those of England or other countries, it is more juicy and keeps well; but it is of coarse texture and flavour. The tree is very hardy and stands a cold climate well. The varieties of Pear number about fifty or sixty; some ripen in the early summer, others in the winter, and some are able to be kept until the next summer. The largest kind weighs one pound. This variety is distributed all over the central and northern parts of Japan. European varieties are also being cultivated to a small extent.

Marumero (*Cydonia vulgaris*).—The quince is only found in a wild state, and is used as a stock for grafting pears on.

Zakuro (*Punica Granatum*).—The pomegranate can be found all over the country, but it is of no importance. There are seven or eight varieties, and some grow to the weight of one pound.

Biwa (*Eriobotrya japonica*).—The loquat is chiefly grown in the south of Japan, and is fit for eating in the early spring. Its cultivation has been very much improved recently, and it has a most delightful taste, which somewhat resembles mangosteens. I think this tree was introduced to the south of France and Italy, but it would appear with not much success. Each fruit of the present improved varieties weighs five ounces.

Kaki (*Diospyros Kaki*).—The persimmon has been cultivated in Japan from time immemorial, and there are almost one hundred varieties. It is grown mostly in central Japan; it does not flourish in a cold climate like that of Hokkaido. Certain varieties gradually become sweet in taste

as they ripen on the tree, but others remain unpalatable. Those which do not lose their astringent taste on ripening are treated in a certain manner by which they become delightfully sweet and eatable. Some varieties, which are too small to be eaten, are utilised for obtaining a liquid which is used for preventing linen and cotton materials from being affected by moisture. Others with an astringent flavour are made eatable by drying; they are capable of being preserved in that state, and are very popular.

Kankitsu (Citrus).—The orange includes very many varieties, but the following can be mentioned as the principal ones:

Mikan (Citrus nobilis), the Mandarin.

Tachibana (Citrus nobilis, var. Koji), the Tangerine orange.

Dai-dai (C. Aurantium), the sweet or common orange.

Jabon (C. decumana, W.), the shaddock.

Kinkan (C. japonica), the kumquat.

Yuzu (C. Aurantium, var. Yuzu).

Kuen (C. medica var. cedra), the citron.

Remon (C. Limonum), the lemon.

Remon (C. Limetta), the lime.

Henshu (C. hybrida).

Minor varieties of these principal ones are probably more than 150 in number.

Among the above the first variety of the Mandarin species yields the largest supply to the market, and one seedless variety called the 'Unshu' affords a supply from the late autumn to the end of the ensuing spring; a third variety includes several minor ones, and has recently received an addition in the introduction of the seedless American navel orange, which is now on sale in the markets of Japan. The fifth and sixth varieties are used for cookery; the ninth variety was introduced from abroad; of the tenth variety some can be stored till the next summer. The locality for its cultivation is limited to the central and southern counties, and the fourth variety is only the produce of the southern counties. The districts where the Mandarin oranges are chiefly produced are Wakayama prefecture and Shizuoka. On the whole the orange is the most important fruit in Japan.

Oriibu (Olea europæa).—The olive was introduced some thirty years ago, and has been planted experimentally in the south of Japan.

Momo (Amygdalus persica).—The peach is cultivated in the central counties; though there are many varieties, none of Japanese origin are very good, but one introduced from China about thirty years ago proved most successful in some parts of the country, and now yields a good supply.

Mizakura (Prunus Cerasus).—The cherry is only known in Japan for its beautiful flowers. Fruit-bearing trees have been imported, but seem only to succeed in the northern counties.

Anzu (Prunus armeniaca).—The apricot produces good fruit; it is eaten either raw or dried.

Sumomo (Prunus domestica).—The plum has several varieties, some red-skinned and others white-skinned. European kinds are being introduced.

Natsume (*Zizyphus vulgaris*), Jujube.—The native Japanese fruit is inferior to the Chinese in size, and the latter are more generally cultivated.

Mume (*Prunus Mume*).—The mume plum has been highly esteemed by the Japanese from olden times on account of the fragrance and hardiness of its flowers, which blossom in the severest frosts of the winter. The varieties cultivated for blossom are numerous, while barely ten are grown for fruit. As the fruit is very acid it is not suitable for eating raw, but when pickled in a particular way it constitutes one of the most useful articles of diet for all classes of Japanese, especially lately, when it has been used in providing soldiers with a sub-food when they are on campaign. This tree is the most indispensable of all the fruit trees of Japan.

Budo (*Vitis vinifera*).—The vine has long been cultivated in the Kai and Kawachi provinces, and is very prolific, but the crops are inferior to the French sorts. The cultivation of French vines has been attempted in some parts, but up to the present with little, if any, success. This perhaps is due to proper care not having been taken when they were in flower, and to the quantity of rain in Japan being too great for the vines.

Fusasuguri (*Ribes rubrum*).—The currant has only recently been introduced, and is not much used.

Suguri (*Ribes Grossularia*).—The gooseberry occurs only in a wild state in the mountains, and its edible properties are very little known.

Kuchigo (*Rubus Idæus*).—The raspberry grows wild, but the crops are insignificant. The French raspberry has been recently introduced.

Ichijiku (*Ficus Carica*), the fig.—Though known very well does not seem to suit people's taste, and no effort has been made to introduce any good kind from abroad.

Kuri (*Castanea vesca*).—The chestnut grows in a wild state, and is often planted for the purpose of affording a supply of good timber. The trees in fruit gardens produce good crops, some fruit acquiring a length of an inch and a half. It is chiefly used in cookery. The fruit is exported to the United States.

Kurumi (*Juglans regia*).—The walnut is generally planted for timber, while its fruit is mainly used for making cake. Seven or eight varieties are grown.

Hashibami (*Corylus avellana*).—The hazelnut is found wild, but it is never cultivated.

Ringo (*Pyrus Malus*), the apple.—The native apples are much inferior to the American and English ones, but since the introduction of these kinds Northern Japan has supplied excellent apples, and they are now exported to China and Korea. Among the fruit trees which have been introduced from abroad comparatively recently, the apple is one of the most successful.

The fruits dealt with above are those which are cultivated or grown in Japan proper. In Formosa many tropical fruits are cultivated, and the Formosan Government is encouraging their improvement. The following are the principal ones :

Mibasho (*Musa sapientum*), the banana.

Yamamomo (*Myrica rubra*), the candleberry myrtle.

Hori (*Ananassa sativa*), the pineapple.

Mango (*Mangifera indica*), the mango.

Mangosteen (*Garcinia Mangostana*), the mangosteen.

Miyashi (*Cocos nucifera*), the cocoanut.

The vegetables and fruits which I have mentioned are all grown out of doors. In the neighbourhood of Tokyo the cultivation under glass of some of them has been attempted, but not for commercial purposes. As the standard of living of the people rises, I hope the use of plant-houses for growing fruits for market will become more general, and will yield an ample profit from a business point of view.

CHRYSANTHEMUM: KIKU.

THE HISTORY OF CHRYSANTHEMUM CULTIVATION IN JAPAN.

By N. HAYASHI.

ALTHOUGH the exact date when the chrysanthemum began to be cultivated is unknown it must have been previous to the year 800 A.D., as we find the name of this plant mentioned in the history of those days as well as in poetry which is known to have been written at that period. History gives an account of an occasion when the Korean Court in 818 A.D. presented to our Emperor Nintoku some plants of a yellow-flowered chrysanthemum. It seems to me, however, that the cultivation of the chrysanthemum was at its best about the sixteenth century. The most convincing evidence I can offer for this statement is a magnificent picture which is an heirloom in Marquis Takatsukasa's family, depicting a chrysanthemum garden of that epoch which was made in Kyoto under his ancestor's care. Looking at the picture, one can see that the garden was a most admirably arranged one from every point of view, and we wonder even now how such a perfection of the art was attained. A copy of this picture was exhibited at the Paris Exhibition of 1900, and aroused great interest among the visitors. We are now far behind those days in this art.

THE ORIGIN OF THE JAPANESE CHRYSANTHEMUM.

It is not likely that the above-mentioned presentation of chrysanthemum plants by the Korean Court introduced this plant into Japan, for, while engaged in investigating the matter, I found out that similar flowers to the present varieties could be obtained by various processes of hybridisation, of the same or different species of purely wild-grown plants. I believe the following are the parent plants of our present chrysanthemum :

- (1) Ko-hamagiku, *C. arcticum*.
- (2) Abura-giku, *C. indicum*.
- (3) Hama-giku, *C. nipponicum*.
- (4) Iso-giku, *C. marginatum*.
- (5) Iwa-giku, *C. pallasianum* var. *japonicum*.
- (6) Yama-giku, *C. sinense* var. *japonicum*.

Nos. (1), (3), and (6) are regarded as more closely allied with the cultivated flowers.

The chrysanthemum is cultivated throughout the country from Kinshyu, the southernmost part of Japan proper, to the north of Hokkaido, but most of the localities, according to their different tastes, specialise, one may say, in certain varieties; and therefore the only gardens where you can find every variety represented and grown to perfection would be those of the Royal palaces, and Count Okuma's, both in Tokyo.

I now give a brief description of certain varieties.

O-giku, a large flower. As you may see in figs. 1, 2, and 3, the kinds which are commonly known in this country as the "Japanese varieties" are included in this class.

The blossoms with tubular petals are much prized by the Japanese, according to whose taste the centre of the flowers should distinctly maintain the normal state of its development, so that the stamens are not modified into petals. The petals should be spoon-shaped and their ends turned over towards the centre, making a soft curl; they should not be so feeble as to show any sign of drooping, while a wire-like stiffness in



FIG. 1.

the petals is also undesirable. The flowers, on the whole, should have a shiny appearance and be of large size. What Nicholson, in his "Dictionary of Gardening," calls the variety 'What Ho' can be likened to the flowers belonging to this class, except that their petals have not the same drooping tendency possessed by the 'What Ho' variety. This class of blossom can be termed "large tubular-petaled flowers," and they are shown in fig. 1.

The next are the flat-petaled blossoms. They also include some of the kinds known here as the "Japanese varieties," namely, those shown in figs. 3 and 4. In this class the centre of flowers should be normal and the

petals should curve inward as shown in fig. 4, and the ends of the petals should neither divide nor be developed grotesquely. Even more necessary in a good plant than this curving of the petals, is what I may be allowed to call a refined appearance of dignity and simple grandeur, without which, however large and brilliant a flower may be, it appears to us to be inclined to vulgarity and ostentation, and as such is regarded as an inferior plant. It is naturally extremely difficult for me to explain the meaning I wish to convey in making use of such words as dignity or vulgarity when applied to a plant. But I feel sure that you have



FIG. 2.

experienced the same feelings yourselves. For instance, supposing any one of you were to live in a room in which were two plants, one of a graceful yet splendid nature, and the other of a splendid yet assertive nature, surely I am not wrong in considering that after some time you would prefer the former to its equally splendid but more assertive neighbour; and as a child's character is moulded by its surroundings, so, we consider, in order to obtain the best results we must take an equal care in fostering the good and noble characteristics of young plants.

The localities where this flat-petaled variety is grown are Osaka, Kanasawa, Nagoya, Sendai, Aomori, and a part of Kyoto.

Chu-giku or *Kurui-giku* is a variety extensively cultivated by amateurs; the outer group of its petals are "tubular," and the petals should be sixteen in number. All the other inner petals are flat, and the centre of the flower should maintain its natural shape. The speciality of this class is the curious curves in which the petals grow, and their constant change whilst the plant is flowering. The outer petals, which are tubular, retain their original straight form all the time, and the others, forming the inner ones, curl or twist in almost every form, thus presenting different shapes daily from the beginning of the blossoming till the end. In the class



FIG. 3.

called 'Kurui,' which means grotesquely-shaped, the number of petals varies to a large extent, some even having only one line of the inner petals. Great care must be used to maintain the high quality of the blossom. To produce similarly shaped flowers even from the same variety is no easy task. In Nicholson's "Dictionary," a figure entitled "Japanese Chrysanthemum (Chinaman)" seems to be closely allied to this class, but its outer petals are not tubular. A plant which was exhibited by Mr. G. Carpenter in the Show given last year by this Society, and called 'West Hall Crimson,' seems also to partake of the character of this class.

Ito-giku (the name is derived from its petals being like threads) includes two varieties: one has upright petals and the other drooping petals.

(1) *Saga-giku*.—Its petals are like fine threads and stand upright, and are capable of being as grotesquely curved as those of the *Chu-giku*. This kind is chiefly cultivated in Kyoto.

(2) *Ise-giku*.—Though its petals are quite as delicate as those of *Saga-giku*, they do not change their shape nor bend downward. A kind given



FIG. 4.

in Nicholson's "Dictionary" as the 'Golden Shower' is identical with this flower and, as the name indicates, it is cultivated in the Ise county.

Ko-giku, known here as pompons, is divided as follows:

Nanako.—The flowers are quilled like the improved double daisy and are identical with the quilled pompon chrysanthemum given in the "Dictionary" already quoted, as the 'Model of Perfection.'

The petals of some kinds are an inch and a half long, while others are only half an inch in length. There are one hundred varieties, which are mainly cultivated in Nagoya.

Azami (thistle) is like *Carduus crispus*, and there are some ten varieties.

Medama (recurved pompon) is another variety.

Chogi-giku, known as the anemone chrysanthemum, is cultivated in Maibashi district, and there are more than one hundred varieties.

Fukizume.—This incurved variety is inferior to the one grown in this country.

Hironoshi is a single-petaled variety, and the width of one petal is as much as two inches. Fig. 5 shows a flower of this kind. Its cultivation seems to be almost entirely confined to Osaka, and although those shown in the pictures were reared by me in Tokyo they are inferior to those of



FIG. 5.

Osaka in quality. A properly grown one will have sixteen petals. The fact that the chrysanthemum crest of the Japanese royal family is sixteen-petaled suggests that it was derived from this particular kind of chrysanthemum. The white seedling exhibited by Mr. T. B. Fortescue is of a similar kind to this.

Ichimonji-giku is chiefly cultivated in the Kumanamoto district; the petals are all tubular and shoot out vertically from the centre as if they were made of wire. The petals of this flower are usually few in number.

Ennichi-giku is the kind which is most extensively cultivated by the Japanese florists for sale, and is very popular with the "masses" as pot

plants. There is no particular regulation for its shape, and the more grotesque and bizarre a form it assumes, the better pleased its owner usually is; but generally the petals are harsh in appearance and the centre of the flower is converted into petals. I think this is the original chrysanthemum which was introduced to this country, the descendants of which have been greatly improved by careful cultivation, and are now known in England as the Japanese varieties. I used to cultivate thirty thousand chrysanthemums of different varieties from seed every year, but it was seldom that I was able to select five good specimens out of that number: that is, according to our idea of a perfect flower.

The cultivation of the chrysanthemum can be divided into two different styles, one adopted by amateur growers, and the other by professional florists. The method resorted to by the former is more ambitious than that of the latter, and their object is not only to succeed in cultivating those kinds from which it is very difficult to raise good flowers, but in growing also good leaves and regulating the shape of the whole plant. Naturally it is a more costly method than that of the professional. On the other hand, the florist's sole desire is to grow plants which do well when shifted into pots, and to produce brilliant flowers which would appeal to the common taste of the people; and of course, this being less expensive, answers their purposes better. One class of florists are exclusively engaged in growing pompons which are used for a particular purpose. They hold shows every autumn, where the pompons are exhibited not merely for the display of their blossom, but also for decorating figures and miniature landscapes of many descriptions. The scenes are generally taken from the plays at the theatres, the figures in them being commonly those of popular actors or sometimes notable people of the day. To carry this out, the pompons are planted in a tolerably open ground, and as soon as the flower buds become visible they are shifted to places where the stems and branches of the plants are twisted all over the skeleton frames of figures and the framework of landscape scenery, so that when the plants come into blossom they will portray in flowers the person and scene which it is intended to represent. Dango-saka Street is a noted place in Tokyo for these exhibitions, and the shows, which are held in the florists' own gardens, draw a considerable number of people, and the place is one of the pleasure-grounds in the autumn for holiday-makers.

AMATEUR METHODS OF CULTIVATION.

Zukuri (Giant Plant).—This method is to cause a single plant to grow as large as possible and make it bear more than a thousand flowers. One of my friends succeeded in cultivating a plant of the same species and was rewarded with a gold medal at the Paris Exhibition. The kind to which this method is applied is either the O-giku or Chu-giku, both of which have been already referred to, and a careful selection is imperative to ensure a plant thoroughly capable of immense growth. The strongest cutting should be taken from the parent plant during November and planted in a sheltered bed or frame, and allowed to remain there until the following April. In May it must be shifted to the flower-stand. The

principal points of difference in the culture of this plant from others consist in the large quantity of manure required, and the multiplication of the branches by as many as six successive "stoppings." The last should be done not later than the middle of August, as in order to arrange the flower-stalks in the prescribed way, and to ensure their producing good flowers, you must leave ample time to permit the last "stopped" branches to attain the length of two or three feet. As regards the "stoppings," they should be carried out as follows :

The first must cause the stem to bear 8 shoots ; when each of these has 5 leaves they are "stopped" to induce each to bear 8 shoots ; these are "stopped" in the same manner. This process is continued five times ; so that after the second stopping the plant will have 24 shoots, after the third 72, the fourth 216, and the fifth 648 ; but on the sixth all should not be "stopped," as by this time some may begin to show signs of strain, owing to the constant "stoppings," and no longer be strong enough to stand the operation. Thus, assuming that there remain after the fifth "stopping" one-third of the total number of shoots strong enough to bear it, the sixth will bring in 648 new shoots, and with the addition of this 648 to the 432 which did not undergo the sixth "stopping" the final number of 1,080 shoots is attained. Staking these shoots requires the most skilled management.

Ipon-Zukuri (single-stem growing) is a method of producing one flower on a single-stemmed plant (fig. 7), and is applied either to the O-giku kind or Hironoshi-giku. The operation is similar to the one carried out in this country. Until arranged as in the picture, it is cultivated in a pot, the cutting from the outset being cultivated in a bed protected from the frost. But as some strong ones are able to grow to 16 or 17 feet in height, if left there till the time of blossoming, these are planted in pots. The plants should be placed on the flower-stand according to their various finally attained heights, and good care be taken to present a judicious mixture of colours and shapes, thus ensuring a good general aspect.

Binsashi-Zukuri (frame growing) is a method of arranging the flower-stalks, and is applied to the Chu-giku. The cutting should be divided from the parent plant at the end of December and planted in the bed till the following May, when it must be planted on the flower-stand in soil 5 inches deep. The plant has to produce either fourteen flowers or twenty-four. Particular care must be taken to prevent the flowers blossoming at different times, and also to arrange the plants in rows according to the heights to which they will grow when they attain maturity. The surface of the soil on the stand should have the appearance of having been long undisturbed, and any "scratch" on it is detestable in the eyes of the expert, as a plant once shifted there is not supposed to be moved again unless it shows its unfitness for the stand, and if so moved it forms indisputably an evidence of the gardener's lack of skill. The first "stopping" must be made while the plant is still in the bed. On the stand three plants are planted together, and on the second "stopping" the branching will be increased to about twenty in all. Of these, fourteen branches will be selected. The same remarks as were made in the preceding paragraph as regards the arrangement of the plants can be also

applied to this kind. If the buds which appear on the extremities of the branches are too precocious, they should be picked off, leaving the side branches for flowering.

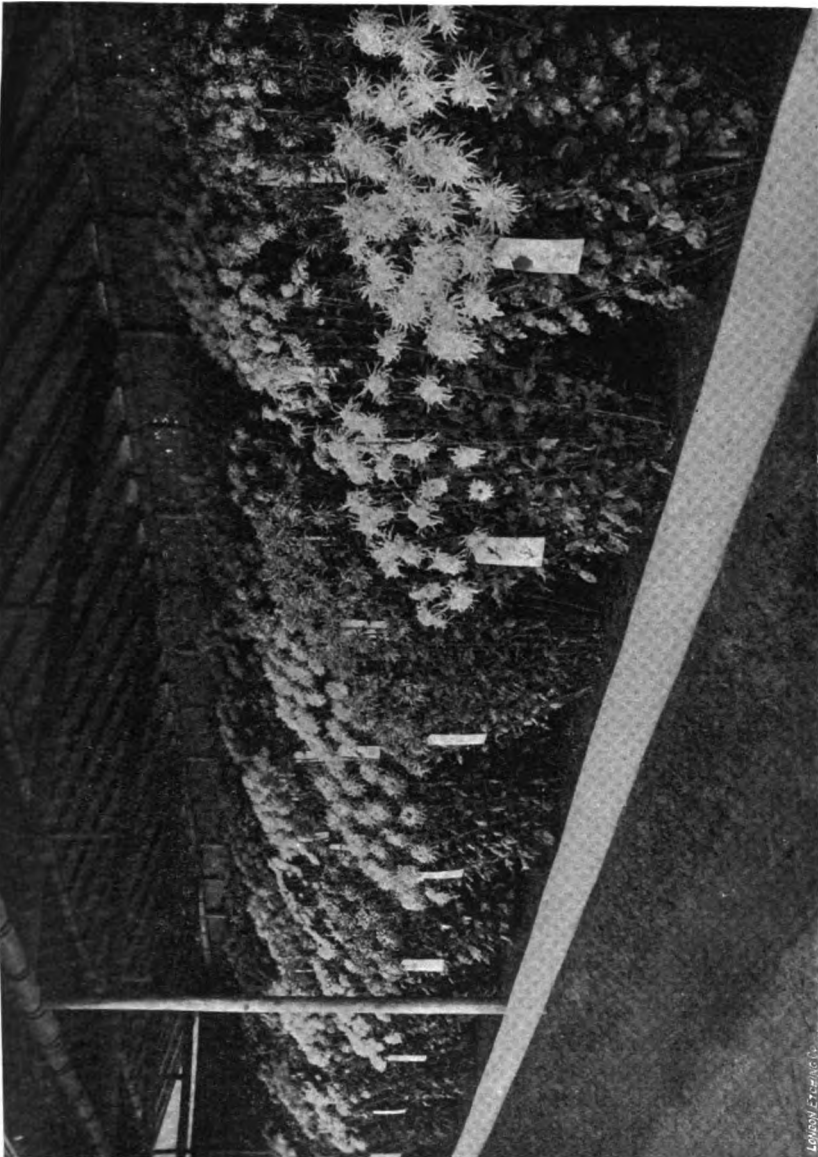


FIG. 6.

Shino-Zukuri is a term applied to a method by which the flower-stalks are fastened to bamboo sticks before blossoming in the manner shown in fig. 6, and this method especially suits cultivation on a large scale. The flower-stand shown in the picture is 90 feet long by 30 feet wide, consisting of five rows. The method can be applied to the

Chu-giku as well as Ito-giku, and the process of production is very similar to the one described under "Binsashi" growing, save that it requires a slightly different method of "stopping," as one group of these plants by this method has to have twenty-six flowers in all.

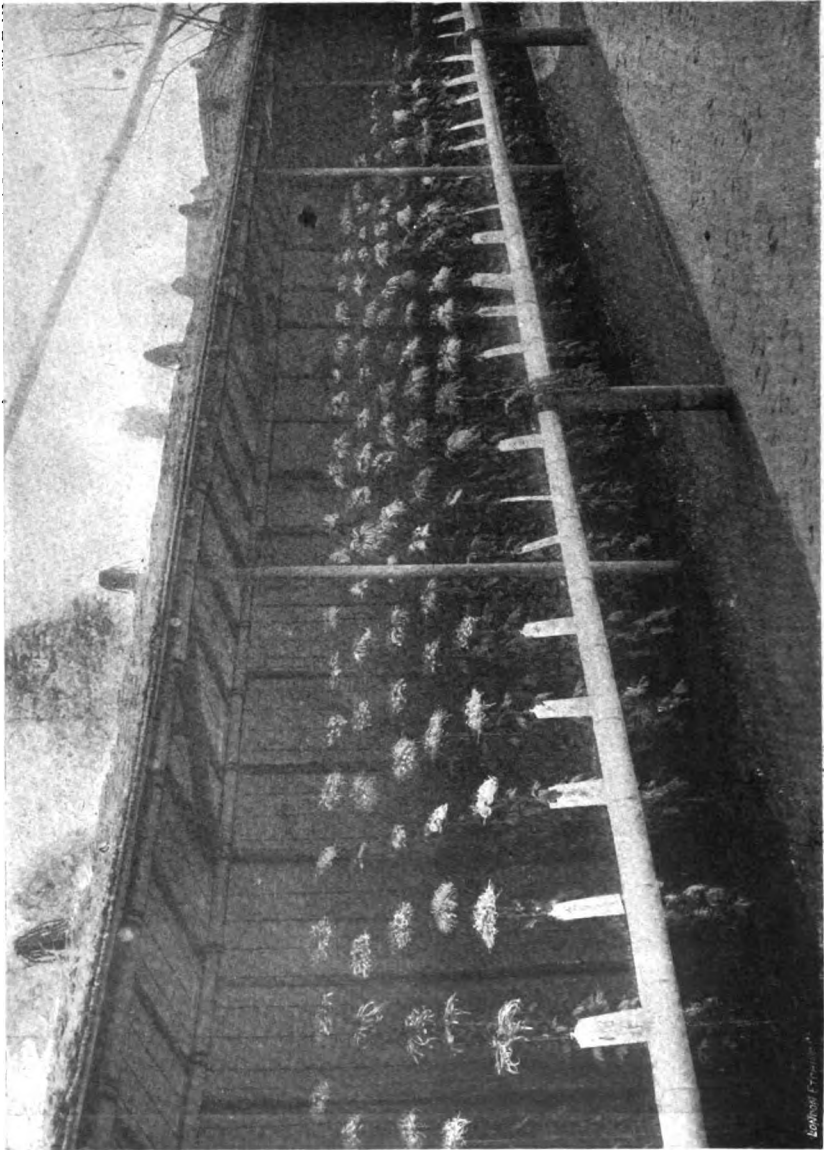


FIG. 7.

Hoki-Zukuri.—In this method the leading stem of the plant is supported by a string instead of by bamboo sticks, so that the plant appears as if it had no support. Each plant should have seven branches and seven flowers, the six side branches being trained to be lower than the stem.

The Chu-giku and Saga-giku will do best with this method, but the kinds which are capable of producing strong-petaled flowers are preferable, as the flowers are liable to incur some injury from the unsteadiness of the branches.

Tsugiki-Zukuri (by grafting).—This method is resorted to to produce various sorts of flowers on one plant. The process of "tying-up" and cultivation in this method is materially the same as that for the O-giku, and wedge-grafting is employed. The best specimens are to be found in the garden of our Royal family. Plants of this kind seem to me likely to be very popular on such occasions as flower shows.

Bonsai-Zukuri (dwarf-growing).—The object of growing the chrysanthemum in this manner is, as it is in the case with other plants, to destroy as little as possible the natural features of the plant, and therefore the kind to be treated under this operation should be the single-petaled variety, which is the natural state of the flower.

CULTIVATION BY NURSERY GARDENERS.

The method resorted to by nursery gardeners in cultivating the chrysanthemum resembles in a great many respects the one prevalent in this country. The propagation is effected chiefly by cuttings, and plants are planted in pots. Generally, two or three plants are put together in one pot and grow to two or three feet in height. The price for one pot varies from 1s. to 8s.

The pompons which are to be used for the representations of scenes, figures, &c., are shifted from the open ground to the required place, their roots being well wrapped in damp moss. In this way the flowers will last for a period of twenty days.

It has already been mentioned that the professional method of cultivation is very much simpler than that of the amateurs, and for that reason I have nothing to add under this heading to the statement I have already given in connection with the amateurs.

I have purposely omitted dealing with such problems as the propagation of the plant, preparation of the soil, the procedure of culture, summer quarters, and prevention of enemies, partly for the reason that they are carried out in this country in such an excellent manner, and partly because my lecture has already reached its limits. One thing I must emphasise is, that manuring the already mentioned Chu-giku, Saga-giku, and Hironoshi-giku should not be done with too liberal a hand up to the time of their flowering, for too much nourishment results in making the flower petals too robust and harsh.

TREES IN A JAPANESE GARDEN.

By KENKICHI OKUBO, of Osaka.

Fixing on the position of trees in a garden is one of the most important points of gardening. Even if there are no big stones or rocks on the ground, views and vistas can be well arranged with trees only. But if the latter are planted without judgment the whole charm of the garden will be destroyed and the effect of beautiful association lost. The size and height of trees should always be borne in mind, so that they may be planted closely, or more widely apart, according to circumstances. Formerly pines were treated very strictly and methodically, so as to make them the one favourite garden tree, and their rounded heads, which gave a fanciful decoration to the garden, were trained and cultivated with much pains and skill. Recently, by adopting a different style, trees of more natural growth, with but little artificial bending and trimming, have come into general use, and the old way of treating the trees has gone out of fashion. This has had a lamentable effect on the development of our art. However, the chief rule which gardeners must now observe is to follow nature as closely as possible, and keep plants in their natural associations. For example, plants which grow naturally in the mountain recess or in the solitary woodland should not be planted at the water's edge, or the plant which grows naturally by the water should not be introduced upon the hillside or in the park. Unless, indeed, due regard is paid to differences of temperature and climate, few plants will thrive.

As a general rule, deciduous trees should never be placed in the most prominent positions in a garden, though at the same time flowering trees and shrubs like cherries and plums are an exception to this rule. Some plants are peculiar to valleys and some to hills; some are found at the water's edge, some high up on the hills. Some few are found both on the hills and near the water.

If a tree is planted near the end of a bridge, one should be chosen which will stretch its branches over it, and throw its shadow on the surface of the water. By the side of a cascade, too, a tree should be selected which will hang its branches across it, for it is not considered to be in good taste to show the whole volume of a torrent. By the side of garden seats, kiosks, summer-houses, &c., such trees should be selected as will throw their branches over them and afford a grateful shade. For this purpose, pines are generally chosen, but chestnuts and persimmons are also occasionally used. Pines and other evergreens should be planted so as to hang over the fences and break the hard lines of the latter. Trees planted by a pond should be so placed as to throw a cool shadow over the water in the heat of summer, and to look attractive in the moonlight.

In planting a group of trees, two, three, or five should be used, and they should neither be planted regularly in a row, nor be so crowded

together as only to give the effect of one. If two only are used, they should be planted thus .°; if three, .:; if five, .°°.°

Close to the fences, some trees of the same height should be planted, and in this position the plum is considered to be the best; the trees should be small and of bushy growth. The stone lantern should be partly sheltered by trees either at the back or in front, and opposite the stone basin which is used in gardens for washing hands, trees are generally planted so that their shadow falls on the water; the boughs should be about 14 inches above the basin, but they should be disposed with much care in order not to interfere with any pretty views. Also, by the well in the corner of the garden, two or three trees—such as pines, plums, bamboos, or willows—should be so placed as to add to its attractiveness. Poisonous trees or shrubs should be avoided; or, if high trees are used, care must be taken that they should not impede views of the moon or restrict ventilation, particularly in the summer, so they must not be planted too closely together.

HORTICULTURE IN RELATION TO MEDICINE.

By E. M. HOLMES, F.L.S.

[Lecture given on May 23, 1905.]

ALTHOUGH the art of horticulture must have commenced at a very early period in the history of civilisation, the only ancient records available indicate that little if any regard was paid to the culture of plants for use in medicine. The character of the earliest gardens is suggested by the brief description of the Garden of Eden, which contained every tree that is pleasant to the sight and good for food. The mythical account of the Tree of Life is chiefly interesting from a medical point of view in that it indicates a belief that medicinal and life-giving properties reside in plants, and the story of the creation of Eve in that it recognises the possibility of surgical operations being performed under the use of anæsthetics or hypnotism, such as might have been known to the Egyptians. The fact is probably often overlooked that it was when Adam was cast into a *deep sleep* that the first and most extraordinary surgical operation on record was stated to have been performed.

It may be interesting here to inquire how a knowledge of the medicinal properties of plants was first obtained. Doubtless, in the case of savages, by experiment as to the edible nature of plants, as in the case of Eve, or as to their cooking capabilities, as in that of the sons of the prophets who gathered wild gourds and shred them into the pot, discovering thereby the bitter, purgative, and griping properties of the now valuable medicinal colocynth, or bitter apple, a plant not uncommon in Palestine. To imaginative persons any characteristic feature of a plant would naturally suggest a particular use, and would be taken as an indication that Nature signified that the plant should be so used, and thus doctrine of Signatures, as it is called, apparently developed. Many instances of this belief occur: one can easily understand that the extraordinary likeness of the seed of the strophanthus to an arrow should suggest to the untutored savage its use as a poison for arrows: that the red colour of certain plants (e.g. *Polyporus sanguineus*) should be taken as an indication of their value for stopping bleeding, and that the yellow colour of others should point them out as a remedy for jaundice, as, for instance, berberry bark (*Berberis vulgaris*).

The mandrake (*Atropa Mandragora*) is another instance of this belief. The root occasionally presents a faint resemblance to the human form, and this apparently suggested its use to Rachel as a remedy for sterility. Even at the present day the root is sold in Egyptian bazaars as a charm. A *trimmed* specimen brought thence a few years ago, by Mr. W. Martindale, presented a stronger resemblance to the human body than it would otherwise have done. Its use probably led to the discovery that it possessed anæsthetic properties; for, as shown by Dr. Sylvester, it was used in ancient times, before undertaking surgical operations, as we use

chloroform now, and the singular legends that arose concerning the danger of death to those who gathered the root were doubtless circulated to prevent, if possible, its use for criminal purposes of robbery and murder. This danger is illustrated in the use of cannabis in the time of the Crusaders and by that of *Datura alba* in India by the Thugs, and by its present use in China. The celebrated ginseng root of China (fig. 9) often presents a great similarity to the human form, and is likewise used as a remedy for sterility, and given as a powerful invigorating tonic to moribund persons to prolong their life when necessary for legal purposes for a few hours. Selected pieces of this root are sold for their weight in gold, and the cultivation of the plant is carried to a very large extent in Corea, Manchuria, and Japan, and proves a very lucrative industry.*

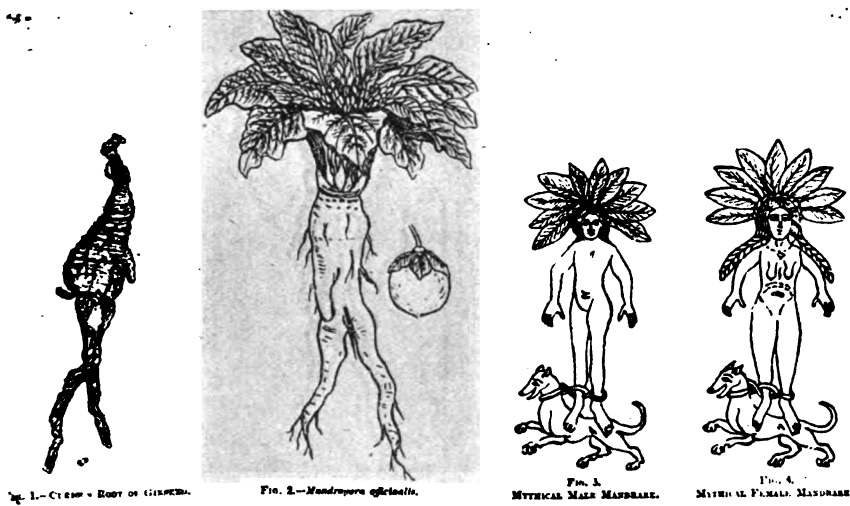


FIG. 8.—THE MANDRAKE (*ATROPA MANDRAGORA*).

It is difficult to estimate the knowledge of the ancient Egyptians in the art of horticulture, for it would seem from the passage in Deut. xxii. 9 that the cross-fertilisation of flowers and hybridisation were understood, for the sacred record directs that "thou shalt not sow thy vineyard with divers seeds: lest the fruit of thy seed which thou hast sown, and the fruit of thy vineyard, be defiled."

It is possible that a few medicinal plants were brought from abroad and cultivated in Egypt, for there are sculptures existing which show that in the reign of Queen Hatsasu specimens of the trees yielding frankincense (fig. 10) were brought to Egypt from the land of Punt (probably S.E. Arabia, as the plants are represented as being brought by ships, which would not have been the case if by Punt was meant Somaliland, where these trees are abundant). But it may have been that frankincense trees were valued on account of the fragrant resin, used as incense, obtained from them, and not for their medicinal properties.

* *Pharm. Journ.* (4) xviii. 498, 652.

Their records indicate that considerable progress had been made by Egyptians in horticulture in the time of Thothmes III., about 1,000 years B.C., as the illustration on p. 46 will show. It represents a royal garden planned by Nekht, who held the office of head gardener of the gardens attached to the temple of Karnak. The garden was rectangular in outline,



FIG. 9.—GINSENG PLANT (*PANAX QUINQUEFOLIUM*).

and is shown to be enclosed by a wall with a canal in front of it, connected with the river ; outside the wall there is a row of trees, between the wall and the canal. The vinery occupied the centre, on a kind of pergola formed of transverse rafters resting on pillars. At the upper end of the garden there was a building of three stories of rooms, shaded by trees,

forming a pleasant retreat in summer. Outside the vinery were rows of palms, interspersed near the outer wall with the branched Doum palm and other trees. There were four tanks of water for irrigating purposes, in which the lotus was grown, bordered by grass-plots where geese were kept, and small kiosks or summer-houses, shaded by trees, stood near the water, and overlooked beds of flowers. Each space was enclosed by walls, and there was a small subdivision between the tanks for special trees, either bearing fruit of superior quality or requiring special attention.

The identification of plants mentioned by ancient writers has always been more or less a matter of difficulty, and this applies even to the plants mentioned by Solomon (apparently as if growing in his garden)

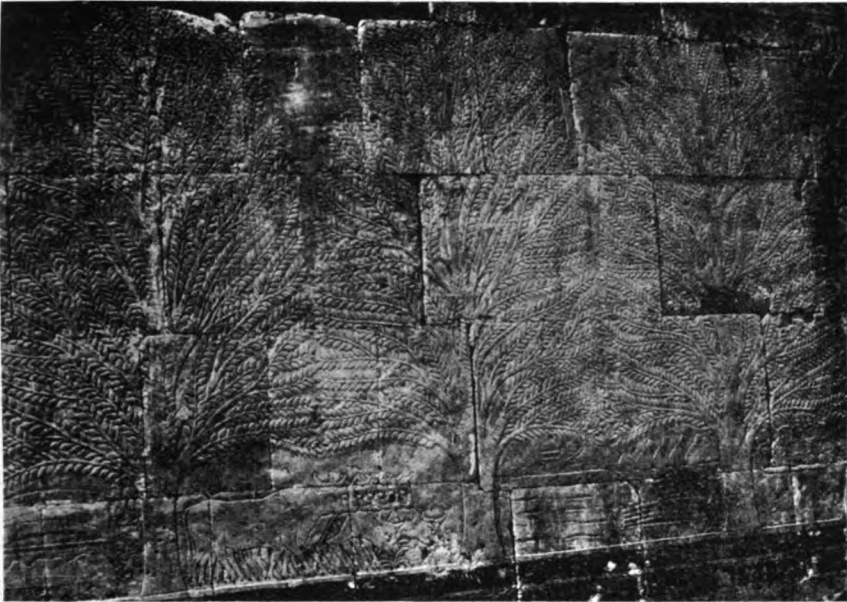


FIG. 10.—FRANKINCENSE TREES (PINUS SPEC.). (From an Egyptian bas-relief.)

(Eccles. ii. 5; Cant. iv. 12-14), viz. henna, spikenard, saffron, calamus, cinnamon, frankincense, myrrh, and aloes.

But although drugs known by the names of calamus, myrrh, saffron, and cinnamon are all employed in medicine in Europe at the present day, possibly they were then only used as fragrant plants, since they are mentioned in conjunction with all the chief spices. It is doubtful what plant is meant by calamus, but it is certain that the fragrant *Acorus Calamus* is grown throughout the world, and is used both as a perfume and as a medicine in almost every country from England to Japan, and even by the native Indians in the Hudson's Bay territory. The word here translated "myrrh" is probably not the drug now called by that name, but the scented gum-resin now known as "perfumed bdellium," which forms the chief ingredient in the modern perfume sold under the name of opopanax.

The myrrh that is found in Chinese collections of drugs at the present day is always this perfumed bdellium (and never the bitter, aromatic, but not fragrant myrrh which seems to have been used by the Egyptians for embalming), and this may be taken as an indication that this perfumed bdellium was the myrrh of Scripture. The "aloes" of Holy Writ is not the purgative drug now known by that name, but a resinous wood derived from various species of *aquilaria* (*A. Agallocha* and *A. Malaccensis* &c.),

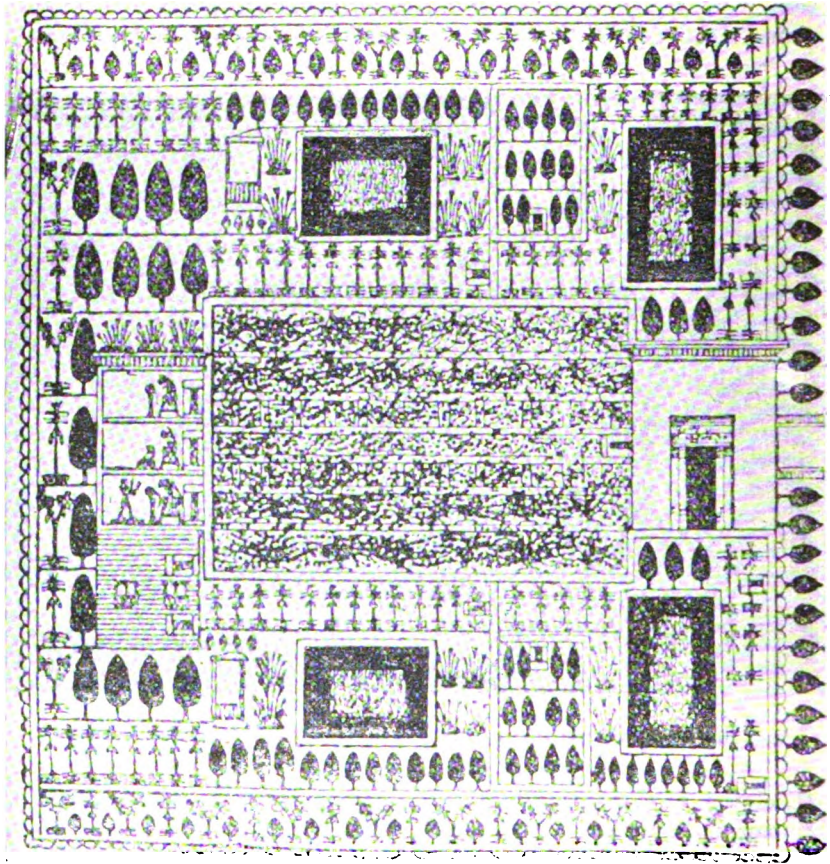


FIG. 11.—A ROYAL GARDEN IN THE TIME OF THOTHMES III.

now known as *lignum aloes*, or *lign aloes*, the woods of which are still burnt to produce a fragrant odour in apartments, in most Eastern countries, and even as far west as Morocco. Concerning the spikenard there is the same difficulty of identification, but the plant that is now generally believed to yield it is a kind of *valerian*, which to modern olfactory organs would, perhaps, not be so acceptable as it appears to have been to ancient peoples; nevertheless, if used in small quantity, it gives a peculiar but not unpleasant character to many Indian perfumes.

The camphire of the old version of the Scriptures, now more correctly translated "henna" in the Revised Version,* has fragrant flowers somewhat resembling in odour those of the tea rose. The leaves of the plant, which is not unlike the common privet in habit, are still used in the East to stain the nails and eyebrows, &c. Of recent years henna has been imported into this country and is sold by herbalists and chemists, probably for use as a brown hair dye. Several of these plants, if really cultivated in Solomon's gardens, must have been brought from the East Indies at considerable expense. It is true that a garden of herbs is mentioned in Deut. xi. 10, and again when Ahab wanted to turn Naboth's vineyard into one (1 Kings xxi. 1-2), but these herb gardens probably contained pot-herbs and aromatic plants used as condiments or savoury additions to food, since Solomon speaks of "a dinner of herbs." It seems probable that the bitter herbs eaten at the Passover (Ex. xii. 8) were herbs growing wild that were gathered for the purpose. Several of the aromatic herbs are mentioned here and there throughout the Sacred Books. Such were coriander, mint, anise, cummin, and fitches (Isaiah xxviii. 27). The last named is a small, aromatic black seed, the produce of *Nigella sativa*, L., which was used by the Jews to scatter on the surface of bread and cakes somewhat in the manner that caraway seed is used in this country in Abernethy biscuits. The Jews now substitute poppy seed for this purpose. So far, therefore, none of these plants appear to have any claim to consideration as cultivated medicinal plants. There is no evidence that the hyssop used in the sacerdotal cleansing of leprosy and in the sprinkling of blood was a cultivated plant. A specimen of the plant brought to me by the Rev. Arthur Hall (brother of the late Newman Hall) from Sinai, where it was given to him by the Arabs as the hyssop of Scripture, proved to be a species of *Origanum*, the Arab name for which ('Zatar') has given rise to the generic names *Satureia* and *Zataria*. The plant has nothing to do with the plant now called hyssop (*Hyssopus officinalis*), nor can the plant mentioned by David (Psalm li. 7) be the purging or hedge hyssop (*Gratiola officinalis*) of the present day, the word "purge" being used rather in the sense of cleansing, probably in allusion to the use of hyssop in the ceremonial cleansing of leprosy. It is interesting to note that the *origanum* given to Mr. Hall by the Arabs contained, like many of the genus, the substance thymol, which of recent years has been employed as an antiseptic.

In the application of figs to Hezekiah's boil (2 Kings xx. 7) we have an illustration of the fact that it is very difficult to draw the line between edible and medicinal plants, or even between them and fragrant plants; for example, oil of almonds and syrup of violets are at the present day used as a domestic remedy for children's cough. It is interesting also as indicating a knowledge, at a very early period, of the solvent action exerted upon animal tissue which has been shown in recent times to exist in the papaw's fruit and leaves as well as in the fig.

Theophrastus Eresius, a native of Lesbos, who lived between 370-285 B.C. and was the earliest botanical author in Europe, refers to about 390 plants or plant-products known in his time, including about forty plants still used in medicine at the present day. This list, as given by

* Cant. i. 14; iv. 13.

Sprengel, includes medicinal products from India, Egypt, and Cyrenaica, a knowledge of these plants probably dating from the Asiatic conquests of Alexander the Great. The list of plants used in medicine was largely added to by Dioscorides, a native of Cilicia in Asia Minor, who wrote a "*Materia Medica*" which is the most valuable source of information on the botany of the ancients. He wrote about A.D. 77-78 and was a contemporary of Pliny, in whose work on "*Natural History*"* about 1,000 plants are mentioned. But even Pliny does not speak of any part of a garden being set aside for medicinal plants. Apparently many medicinal products were imported from Asia and Africa, and others were collected, as required, from wild plants in the localities where they grew.

Some idea of the appearance of a Roman garden may be gathered from the illustration here shown of the inner garden of the house of

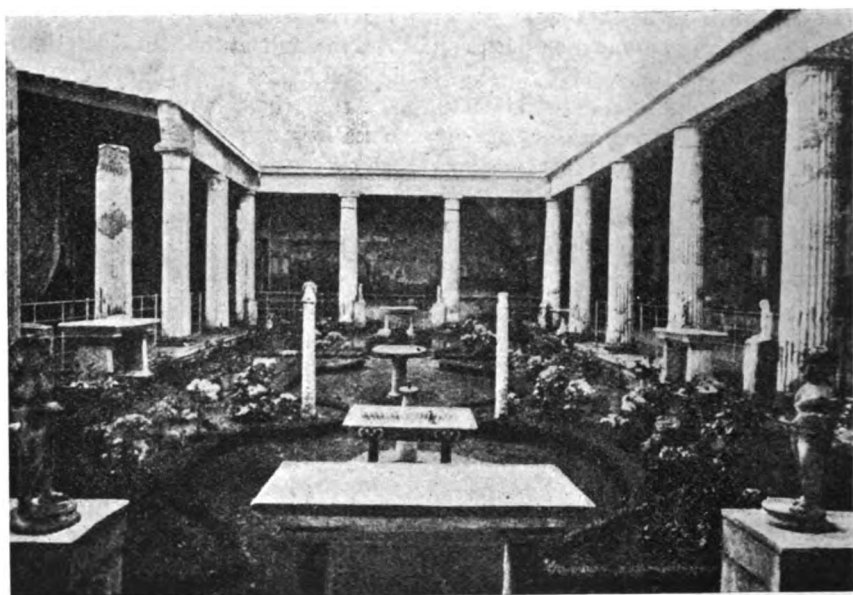


FIG. 12.—INNER GARDEN OF THE HOUSE OF AULUS VETTIUS.

Aulus Vettius found in the ruins of Pompeii and reconstructed from the ruins. Yet by this time horticulture had evidently made great strides, for Theophrastus tells us that at Athens violets were freely sold in winter, and Cato states that in Rome the principal citizens took great interest in their gardens, and that the success of some in cultivating particular plants gave rise to family names such as Cicero, from the chick pea (*Cicer*), Fabius from the bean (*Faba*), Piso from the pea (*Pisum*), Lentulus from the lentil (*Lens*), &c.

At the date of the Roman invasion of Britain, horticulture in Rome, especially in relation to flowers and fruits, had reached a high degree of progress. Thus there were twenty-two or more varieties of apples, one variety being free from pips, and thirty-six varieties of pears, and many

* Lib. xii.-xxvi.

other varieties of fruits, which are described by Pliny.* Indeed, except the pineapple, orange, gooseberry, raspberry, and currant, the list includes most of the fruits now in culture in hothouses, even cucumbers being forced in hothouses warmed by wall-flues and having mica plates instead of glass. In the time of Augustus even the long-berried grapes which they called "dactylides" were known; the cultivation of flowers was carried to excess, and late and early roses were specially grown. Nero is stated to have given a sum equivalent to £30,000 of our money for roses for one supper, and Cleopatra the value of £200 on a similar occasion. The art of horticulture was apparently unknown in Britain before the Roman invasion, for Strabo, writing early in the first century, remarks that "the people of Britain are as a rule ignorant of the art of cultivating plants in gardens"; although Tacitus (A.D. 79) points out that "the soil and climate were suitable for all kinds of fruit trees, and for most vegetables, except a few peculiar to warmer climates."

Traces of Roman gardening remain in the Saxon and English names of various plants, several of which are of medicinal interest, viz.—Magdula treow for the almond, Haennet for hemp, Celendre for coriander, Lactuca for lettuce, Lufestice for lovage, Mealve for Mallow, Poppig for poppy, Ruta for rue, and Ulm treow for elm tree. Two rare plants, the one, *Astrantia major*, found near Ludlow, and the other the Roman nettle (*Urtica pilulifera*), occurring near Caistor, still remain as relics of the Roman occupation of Britain. But much of the knowledge of horticulture was lost when Britain was abandoned by the Romans in the fifth century.

It is remarkable that although we owe the word "horticulture" to the Roman language, the word "garden" is derived from the Saxon, the origin of the word being the Saxon "geard" or "garth," signifying an inclosure, an earlier form of the word being "yard," or, as spelt by Chaucer, "yerde," the use of this form still surviving in the Pond Yard at Hampton Court and in the kail yard of the Scotch, and in the family names of Appleyard and Applegarth. The same root also gave rise to the word "orchard," which was formerly called "hort yard," a form of spelling found in Holland's "Pliny,"† and thus distinguished from "wyrth" yard or "herb garden." The same word for "herb" is still in use in many common names of plants, as in St. John's wort, spleenwort, woundwort, &c. "Hortus" is perhaps derived from the Greek *χώρα*, which meant a garden in the Middle Ages as well as in Roman times. The family names Cortis and Curtis are possibly forms of the same word.

The earliest record of physic gardens occurs after the Roman period, and dates from the ninth century, when the separate cultivation of medicinal plants is mentioned in connection with monasteries and abbeys. In the time of Charlemagne several such gardens are alluded to (760-814). In that of the Abbey of St. Gall, near the Lake of Constance, the physic garden is shown in the plan of the grounds near the doctor's quarters. This garden contained sixteen oblong beds, four of which were on each side of the central path, and the remainder formed a border under the walls, each of the beds containing one herb and each having its special label. The medicinal herbs contained in them were amongst the herbs

* Lib. xxv.

† Lib. iv. 20.

ordained by the Frankish Emperor to be grown in his dominions, and are mentioned in the Capitulary. This list was probably added to in course of time, for amongst the herbs forming ingredients in the receipts given in Cockayne's "Saxon Leechdoms" we find the following, which are certainly not natives of Britain: alecost or costmary (*Tanacetum Balsamita*), borage (*Borago officinalis*), balm (*Melissa officinalis*), angelica (*Archangelica officinalis*), hyssop (*Hyssopus officinalis* or *Gratiola officinalis*?), elecampane (*Inula Helenium*), and blessed thistle (*Carbenia benedicta*). It is not, however, stated whether these were brought over from the Continent as drugs (from the Saxon "driagan," to dry), or were cultivated in herbaries.

CHARLEMAGNE'S CAPITULARY.

The plants given in this list include seventy-three herbaceous plants, of which the following are at the present day included amongst medicinal plants or herbs, although some of them are used also for flavouring purposes. These include:—

Anethum (<i>Peucedanum graveolens</i>).	Nasturtium (<i>Nasturtium officinale</i>).
Anisum (<i>Pimpinella anisum</i>).	Nepetam (<i>Nepeta cataria</i>).
Apium (<i>Apium graveolens</i>).	Olisatum (<i>Smyrnum Olusatrum</i>).
Bardanium (<i>Arctium Lappa</i>).	Papaver (<i>Papaver somniferum</i>).
Bismaluas (<i>Althæa officinalis</i>).	Petroselinum (<i>Petroselinum sativum</i>).
Carvum (<i>Carum Carui</i>).	Pulegium (<i>Mentha Pulegium</i>).
Coloquintida (<i>Citrullus Colocynthis</i>).	Rosa (<i>Rosa gallica</i>).
Coriandrum (<i>Coriandrum sativum</i>).	Rosmarinum (<i>Rosmarinus officinalis</i>).
Costum (<i>Tanacetum vulgare</i>).	Rutam (<i>Ruta graveolens</i>).
Cuminum (<i>Cuminum cyminum</i>).	Sabinum (<i>Juniperus Sabina</i>).
Febrifugium (<i>Chrysanthemum Parthenium</i>).	Salvium (<i>Salvia officinalis</i>).
Fœnum-græcum (<i>Trigonella Fœnum-græcum</i>).	Sanicalum (<i>Sanicula europæa</i>).
Lactucas (<i>Lactuca</i>).	Sclareoem (<i>Salvia Sclarea</i>).
Levisticum (<i>Levisticum officinale</i>).	Sisymbrium (<i>Sisymbrium officinale</i>).
Lily (<i>Lilium candidum</i>).	Squillam (<i>Urginea Scilla</i>).
Maluas (<i>Malva sylvestris</i>).	Synapi (<i>Brassica nigra and alba</i>).
Mentam (<i>Mentha viridis</i>).	

The list is remarkable as containing very few plants possessing powerful medicinal properties, the most active being opium, poppy, squill, colocynth, savin, and rue.

It was only when the Norman occupation had reduced the country to some degree of order that horticulture revived. In 1109, Brihtnod, the first Abbot of Ely, had extensive gardens and orchards which he filled with a great variety of herbs and shrubs and fruit trees. One of the earliest writers on gardening in Britain was Alexander Neckham, a foster-brother of Richard I. (1157–1217), and Abbot of Cirencester. In his work, "De Natura Rerum," he mentions, besides the herbs enumerated in the Capitulary, fennel, hyssop, dittany, smallage, wormwood, horehound, and peony as desirable for cultivation in a physic garden.

In the thirteenth century (A.D. 1294) the monks of Dunstable had a herbary attached to their priory, and the herbary mentioned in Chaucer's "Priest's Tale" appears to have been stored with herbs and shrubs. Traces of the plants formerly cultivated in the physic gardens attached to monasteries, abbeys, and nunneries still remain here and there throughout Great Britain, occurring now in a wild state, such as *Aristolochia Clematidis* in the ditch banks surrounding the ruins of Godstone nunnery near Oxford, belladonna near Furness Abbey, borage near Abbotsbury, and *Teucrium Chamædrys* on the old walls of ruins, and *Aconitum napellus* in orchards, and damp places near ruins. Asarabacca (*Asarum europæum*) is another instance. Private physic gardens existed in the time of Erasmus (1488-1526), and some of these developed into municipal physic gardens. The one usually stated to have been the earliest of these public gardens was that formed at Padua in 1548, and arose from Bonaside's garden of simples founded in 1585, although it has been stated that one was instituted at Hamburg in 1816.* Other municipal physic gardens rapidly followed, viz.—that at Pisa in 1544; Bologna, 1547; Zurich, 1560; Paris, 1570; Leipsic, 1580; Jardin des Plantes, 1610; Oxford, 1632; and the Apothecaries' Garden at Chelsea in 1678. The formation of these gardens naturally led to the publication of lists of plants cultivated in them.

Most of these lists were written by persons holding a medical degree in one or more universities, and it is to the knowledge of plants diffused by them that modern medicine owes much, and horticulture is also indebted to a considerable extent, since many of those who studied medicinal plants at these gardens subsequently travelled abroad and added largely to our knowledge of ornamental and useful plants.

The earliest of these lists or herbals extant is that published in 1516 by Peter Treveris, who appears to have been a surgeon. The Rev. William Turner, who held medical degrees at Bologna and Oxford universities, has been called the Father of English Botany. He had charge of one of the earliest botanic gardens in this country at Kew, and subsequently a very fine one of his own, whilst Dean of Wells. His first botanical work was entitled "*Libellus de Re Herbaria*," published in 1588, and was followed in 1540 by "*The Names of Herbes*" and a Herbal in three editions from 1551-1568. The Herbal of Dodoens (Rembert Dodonæus), who was physician to the Emperor Maximilian 1517-1588, and Professor of Physics at Leyden, was published in 1578. He was also author of "*Stirpium Historiæ Pemptades*," upon which Gerarde's "Herbal," published in 1597, was founded. Gerarde was educated as a surgeon and had a large physic garden in Holborn, of which he published a catalogue in 1596, containing about 750 plants. The garden is probably the one delineated at the foot of the title-page, which is reproduced overleaf (fig. 18), of the scarce edition of his "Herbal."

It was about this time that the taste for florists' flowers was brought over from Flanders by the Flemish weavers who took refuge in this country from the persecutions of the Duke of Alva. Gerarde mentions that one James Garret, a London apothecary, was a principal collector and

* Rudolf Mosse in Introduction to *Official Guide to Hamb. Bot. Exhib.* 1899.



FIG. 13.—TITLE-PAGE OF GERARDE'S "HERBAL," 1597.

propagator of tulips, for twenty years bringing forth every season new plants of sundry colours not before seen. "All which to describe were to roll Sisyphus' stone or to number the sands."

An improved and enlarged edition of Gerarde's "Herbal" was brought out in 1688 by Dr. Thomas Johnson, an apothecary, who received the degree of M.D. in 1648. He had a physic garden at Snow Hill. Another apothecary, John Parkinson, who was created by Charles I. "Botanicus regius primarius," was an enthusiastic horticulturist, and published in 1629 a work on garden plants, which he entitled, in the form of a pun upon his own surname, "Paradisi [*i.e.* Park] in sole Paradisus terrestris." His botanic garden was in Long Acre. This work contains very little concerning medicinal plants, but did much to encourage the cultivation of new and rare garden plants. Robert Morrison, who held a medical degree from Angiers (1648) and Oxford (1649), published a valuable work in two folio volumes devoted more to general than to medical botany, entitled "Plantarum Historia Oxoniensis." In 1696 Dr. Leonard Plukenet, who was Queen's Botanist to Mary, published his "Almagestum." He had a botanic garden at Old Palace Yard, Westminster, and was Supervisor of Hampton Court Gardens. Another celebrated Herbal was published in 1710, entitled "Botanologia," by William Salmon, M.D. and Professor of Medicine.

James Sherard, apothecary and physician, had a garden at Eltham, which was considered to be one of the richest in England at the time. He employed John James Dillenius to write an account of it, entitled "Hortus Elthamensis," in 1732. Dillenius, who possessed the medical degree of Giessen and Oxford, afterwards became the first Sherardian professor of botany at Oxford, and edited Ray's "Synopsis Plantarum."

Dr. John Hill, who was the first Superintendent of the Royal Gardens at Kew, published a Herbal in 1756 and the "Hortus Kewensis" in 1768. He had a private botanic garden at Bayswater.

About this time a great impetus was given to the scientific study of systematic botany and horticulture by the purchase of the collections of Linnæus by Sir J. E. Smith in 1784, and by the foundation by him of the Linnean Society, and by his publication of the "Flora Britannica" between 1794-1804. He possessed the M.D. degree of Leyden University. Dr. Robert John Thornton, who succeeded Sir J. E. Smith as Lecturer on Botany at Guy's Hospital, published a Family Herbal in 1810.

After this date the works on medicinal plants were confined more strictly to those official in the Pharmacopœia, and many of the herbs used only in domestic practice were omitted. The earliest one of these, entitled "Medical Botany," was published in 1790-1799 by William Woodville, who was physician to the Small-pox Hospital at King's Cross, where he had a botanic garden.

The "Medical Botany" of Stephenson and Churchill, published in 1891, was an improvement on that of Woodville. John Stephenson held the degree of M.D. of Edinburgh University.

The most recent work in this country on medicinal plants was published by Robert Bentley, M.R.C.S., and Henry Trimen, M.B., in 1878, and included the medicinal plants official in the Pharmacopœia of Great Britain and the United States up to that date.

Many of the botanical gardens, which undoubtedly have spread the knowledge of useful plants, have been started and presided over by members of the profession. Thus the justly celebrated Botanic Gardens at Edinburgh were founded by Sir Andrew Balfour in 1689, and the Directors, ever since, have been members of the medical profession. Dr. J. H. Balfour founded the Botanical Society of Edinburgh, whose members have done, and are still doing, good botanical and horticultural work in various parts of the world. Dr. Walter Wade, who was Professor of Botany to the Royal Dublin Society, caused the establishment of the Royal Botanic Gardens at Dublin in 1790, and his work on the cultivation of willows is still a valuable book of reference.

Dr. James Lawson Drummond was one of the founders of the Belfast Botanic Gardens in 1821, and Dr. Andrew Duncan founded the Caledonian Horticultural Society and established a public experimental garden, and there are few, if any, of the botanical gardens in the world which have not at present, or have not had in the past, some member of the medical profession as Director, or Curator, or Superintendent.

As connecting the past with the present, the old Physic Garden of Chelsea, formerly belonging to the Apothecaries' Company, is one of the most interesting of the old gardens of London. It dates back to 1673, and probably at one time contained the plants from the physic gardens at Westminster, which had been well furnished by Hugh Morgan, Queen Elizabeth's apothecary, and also those from his private physic garden near Coleman Street, which it is believed were also removed to Chelsea. At first the garden was leased to the Apothecaries' Company at a rental of £5 per annum, but when Sir Hans Sloane acquired the land at Chelsea on part of which the Physic Garden stood, he gave the site to the Company on the consideration that it should always be kept as a physic garden, and that the Company should present fifty new plants annually to the Royal Society, of which he was the President, until the number reached 2,000. This direction was complied with until 1773, by which date 2,550 new species had been presented. This is the only one remaining intact of the old physic gardens of London, and in conjunction with the Royal Botanic Gardens at Regent's Park, has supplied for many years the lecturers on botany at the London Hospitals with specimens to illustrate their lectures.

A few years ago the Apothecaries' Company found it impracticable to supply the necessary funds to keep it up, and as under these conditions the ground would have reverted to the Cadogan family, and probably soon have become a prey to the builder, the responsibility of its upkeep was undertaken by the London Parochial Charities, and only last year it started on a new lease of life, as a place for the practical teaching of Botanical Biology.

The Royal Pleasure Gardens at Kew formerly contained a physic garden, which was initiated by the Princess Augusta of Saxe-Coburg-Gotha, who engaged William Aiton, a pupil of Philip Miller, the most celebrated of all the gardeners (*Hortulanorum Princeps*) of the Chelsea Physic Garden, to establish a physic garden at Kew. During the reign of George III., under the powerful influence of Sir Joseph Banks, its scientific character was developed, but during the two next reigns Royalty took but little

interest in the garden. It is probably not generally known that the then Lord Steward intended to turn the houses at Kew into vineries, and actually offered the plants contained in them to the Royal Horticultural Society at Chiswick, and to the Royal Botanic Gardens at Regent's Park, an offer which both gardens fortunately refused. Under pressure of public indignation the charge of the botanical and other gardens was subsequently transferred to the Commissioners of Woods and Forests in 1841. The Physic Garden at Kew has now dwindled to a small special collection in front of the No. 2 Museum, the majority of the medicinal plants, shrubs, and trees being now scattered over the gardens in the special botanical groups to which they belong.

In 1865 the celebrated Kew Gardens came under the direction of Dr. J. D. Hooker (who was subsequently knighted), and enormous strides were made in the knowledge of botany and horticulture. Kew became the centre from which new plants have been distributed throughout the Empire, and from which the extensive cultivation of medicinal plants in our Colonies has been initiated, and it still holds a foremost position amongst the botanical gardens of the world. The present Director, Sir W. Thiselton-Dyer, K.C.M.G., the son-in-law of the late Director, is also connected with the medical profession, being a Fellow of the Apothecaries' Society.

Probably no botanical garden in the world has done more to spread a knowledge of plants and to stimulate the cultivation of beautiful, ornamental and useful plants than that of Kew. It is interesting to note that the very latest beautiful new plant exhibited in these rooms, *Meconopsis integrifolia*, was made known to the world by a member of the medical profession, the well-known Chinese botanist, Dr. Augustin Henry.

It might perhaps have been supposed, when a number of the old herbal remedies were discarded by the medical profession and omitted from the list of vegetable "materia medica" in the Pharmacopœia, that they would have dropped entirely out of use. But such is not the case. Two large London wholesale firms still find sufficient sale for what are now called herbs (to distinguish them from the more powerful medicinal plants used in allopathic practice) to form an extensive trade. This is partly due to the fact that the operatives in the midland and northern counties have found that a tea or beer made from tonic herbs is cheaper and less intoxicating than ordinary beer. This beer is largely used, especially where, as in puddling furnaces and in the potteries, it is necessary to drink often on account of the constantly high temperature in which the men work. Two other preparations, known as Composition Powder and Composition Essence, are also largely used for colds, and as a stimulant. They contain a powerfully pungent and somewhat astringent substance known as bayberry bark (*Myrica cerifera*), the bark of the hemlock fir (*Tsuga canadensis*), cloves, cinnamon, and ginger. Workmen in the large factories in the northern counties often take a teaspoonful of the essence in a glass of water as a substitute for tea before starting for their work on a cold morning in winter. It will be readily understood, therefore, that it is still possible for herbalists to make a living in some of our larger manufacturing towns and cities.

Moreover, the French and German Pharmacopœias have retained until now many herbal remedies, and the French and German pharmacies which can be found in most of our large cities and seaside resorts must be supplied with them. Until quite recently most of these herbs have been imported from Germany and France, where labour is so much cheaper that it did not pay to collect them in this country. But the indifferent character of the herbs supplied, and the constant admixture of other plants either as cheaper substitutions or arising from the carelessness of the collectors, has led on the part of one of the large wholesale herbalists concerned to the cultivation in this country of several of those in great demand, and they find they can thus supply these herbs in a better condition and freer from admixture than when imported from abroad.

It is significant of the advantage of cultivation over collection, that such common plants as the mallow and nettle should be amongst the plants now cultivated, a list of which is here appended :

Balm (<i>Melissa officinalis</i>).	Motherwort (<i>Leonurus cardiaca</i>).
Celandine (<i>Chelidonium majus</i>).	Nettle (<i>Urtica dioica</i>).
Comfrey (<i>Symphytum officinale</i>).	Rue (<i>Ruta graveolens</i>).
Feverfew (<i>Chrysanthemum Parthenium</i>).	Santolina (<i>Santolina chamæcyparissus</i>).
Germander (<i>Teucrium Chamædrys</i>).	Savin (<i>Juniperum Sabina</i>).
Horehound (<i>Marrubium vulgare</i>).	Skullcap (<i>Scutellaria galericulata</i>).
Hyssop (<i>Hyssopus officinalis</i>).	Stramonium (<i>Datura Stramonium</i>).
Mallow (<i>Malva sylvestris</i>).	Tansy (<i>Tanacetum vulgare</i>).

The herbs most commonly used for domestic medicines are agrimony, horehound, yarrow, hyssop, centaury, bogbean, feverfew, vervain, clivers, coltsfoot, fumitory, ground pine, meadowsweet, pellitory of the wall, wood betony, woodsage, mugwort, and wormwood; but about ninety others are still sold by herbalists in this country, exclusive of a number of American herbs that have been introduced during the last fifty years, chiefly by two "doctors" bearing the extraordinary and somewhat ominous names of Skelton and Coffin, whose works on herbal practice have had an extensive sale among the working classes.

Besides the cultivation of medicinal plants at home, there has sprung up in the Colonies, during the last half-century, an extensive cultivation of some of the more important medicinal plants. This has been due largely to the endeavours of medical men engaged in practice abroad, or having charge of botanic gardens. This undertaking has arisen from the careless destruction of the plants in the countries where they grow, and the consequent rise in price of the drugs obtained from them.

Thus it was Dr. J. F. Royle, a surgeon of the H.E.I.C. Medical Service in Bengal and curator of the Botanic Gardens at Saharunpur, who pointed out in 1839 that cinchona could be successfully cultivated in the Neilgherry Hills; Dr. Karsten, who brought seeds of *Cinchona lancifolia*; and a Dr. Weddell, who in 1848 brought seeds of *Cinchona Calisaya* to Europe. In 1861 a plantation was started in Ceylon, and in 1866 there were one and a half million of young trees planted in the Neilgherry Hills, and the same number were permanently planted out at

Darjeeling in British Sikkim in 1872. The first cinchona bark was brought into the London market in 1867, and since then this country has been largely supplied with cinchona bark from Ceylon, Ootacamund, and Darjeeling.

But, to grow cinchona successfully, considerable botanical knowledge and horticultural skill were necessary in order to meet the difficulties of growing the trees, renewing the bark, defeating insect enemies, and collecting and harvesting the bark. An interesting account of the difficulties met with is given in a work published by Dr. (now Sir) George King, K.C.I.E.

In 1882 the cost of quinine to the Indian Government amounted to £25,000, and for cinchona bark to £7,000. Now the Government can provide as much as is required for Indian use and send the surplus to the London market.

The cultivation of ipecacuanha has arisen from the same cause as cinchona, viz. the gradual extinction of the plant in districts where it was once plentiful, and the consequent increase in price. Formerly our supplies came chiefly from the provinces of Matto Grosso in Brazil, but now it comes from the province of Minas Geraes. The cultivation of the plant was attempted in India, but though it was found to be easily propagated, almost every part of the plant being capable of yielding young plants, yet its growth was very slow except under the exact conditions it required, and its cultivation did not prove a success. Moreover, the plant is dimorphic, and the different forms of the plant are not identical in vigour of growth. In Selangor, in the Straits Settlements, the exact conditions required by the plant were met with, and a strong strain of the plant was cultivated, with the result that the drug grown from these now arrives regularly in the London market. Here, again, the success is largely due to members of the medical profession, viz. to the experimental cultivation of the plant by Dr. J. H. Balfour at the Edinburgh Botanic Gardens, and to the observation by Dr. Weddell that a fragment of the plant will strike root if allowed to lie on the ground for some time.

The cultivation of coca leaves in the British Colonies is an outcome of the discovery of the action of cocaine as a local anæsthetic about the year 1876. The rapid demand for this alkaloid caused an immense inquiry for the leaves, and the small quantity of alkaloid obtainable from the imported leaves led to the discovery that the Bolivians kept the fresh coca leaves for their own use and exported the older leaves. In South America the leaves are used to the extent of 30,000,000 lbs. annually, but the native Bolivians will not use them after they have been gathered seven months, or in the coast districts, where the air is moister, after five months. Some little difficulty arose from the fact that more than one species pass under the name of coca leaves, and that one of them contains an alkaloid which possesses injurious properties; but modern chemistry has solved the difficulty, and crude cocaine is now manufactured at Lima, and purified on arrival in Europe.

Natives who chew coca leaves to enable them to endure fatigue and hunger invariably chew it with the ash of *Chenopodium Quinoa* or other plants, or with a little lime, so that the active principle, cocaine, which is an anæsthetic, is thus split up, by the chemical action of the ash or lime, into another body, eegonine, which has a stimulant action on the heart.

This fact has usually been overlooked by those who have simply chewed coca leaves, and have failed to get the results obtained by the natives of the Andean regions.

Time will not permit me to deal fully with the cultivation of Indian hemp for medicinal purposes. It appears certain that its medicinal properties were known in China in the third century, and that the Hashishin (whence our word "assassin") of the eleventh and twelfth centuries derived their name from the use of hashish (the Arabic name for hemp) under the influence of which they committed their crimes. In India there is a fixed belief that the female plant will not yield its resinous secretion unless the male plant is removed, and skilled, highly paid workmen are employed for the purpose of pulling out the male plants, which they are able to discriminate before the flowers appear.

The cultivation of opium deserves some notice, since its use dates from remote antiquity, and no medicinal plant is so widely cultivated or has been so useful to the human race for relieving pain and promoting sleep, or which requires such careful attention and horticultural skill. At one time attempts were made to cultivate poppies in this country for the production of opium, but although opium was obtained containing even a larger percentage of the active principle, morphia, than Turkish opium, it was found that the uncertainty of our climate prevented the regular collection of the juice, and the expenses of labour were too great for profitable cultivation. The poppy, therefore, is now grown in this country only for the capsules.

The cultivation, even in Asiatic Turkey (whence most of the medicinal opium used on the Continent and in the United States is derived), requires rich soil and careful horticulture. The opium cultivated in India is deficient in the active principle, morphia, and is practically not imported into this country; indeed, it is difficult at the present day to obtain even a sample for a museum except by sending to India for it. The Indian opium is largely a Government monopoly, and China is the chief customer for it.

China also grows opium to a large and increasing extent, and as its cultivation pays better than corn, it has been in some districts a cause of famine. Persia is also now a large producer of opium, and as the opium contains a good percentage of morphia, and is cheaper than Turkish opium, it is largely used for the manufacture of morphia.

This method of collecting and preparing opium differs in various countries. The illustration here given (fig. 14) shows the collection of opium from the poppy-heads by native workers in India.

But enough has been said to show that whilst medicine owes much to horticulture, horticulture is much indebted to the medical profession and to the botanic gardens which have been and are still the means of disseminating a knowledge of beautiful, ornamental, and useful plants, and are largely presided over by members of the medical profession, whilst not a few of the most celebrated horticulturists have belonged to the same honourable profession. The familiar names of Hooker, Wallich, Roxburgh, Wight, and Welwitsch are instances in point.

To those who may be inclined to experiment in the cultivation of medicinal plants I may point out that some of the American drugs now largely used are gradually becoming scarcer, and will at no very distant

date probably have to be cultivated to meet the demand. From a few experiments made in my own garden, it is evident that many of them could be grown in this country, such as cascara sagrada (*Rhamnus Purshiana*, DC.), podophyllum, sanguinaria, hydrastis, &c.; whilst



FIG. 14.—NATIVE COLLECTING OPIUM FROM POPPY-HEADS.

others, like American ginseng (*Panax quinquefolium*, Linn.), require special horticultural treatment, as indicated by the high price of the root (90s. per pound) that at present rules in the market.

But the cultivation of the medicinal plants used in allopathic practice, and official in modern Pharmacopœias all over the world, is now carried

on in this country on an agricultural instead of horticultural scale at Ampthill in Bedfordshire, Long Melford in Suffolk, Hitchin in Hertfordshire, Market Deeping in Lincolnshire, Mitcham, Carshalton, and Sutton in Surrey, St. Neots in Huntingdonshire, and near Canterbury in Kent. In some counties there are special plants cultivated, such as liquorice near Pontefract in Yorkshire, valerian near Chesterfield in Derbyshire, and chamomile near Ringwood in Hampshire. It is by no means easy to ascertain the amount of drugs thus grown, but a special inquiry made about the middle of the last century by the late Mr. Peter Squire of Oxford Street will give some idea of the amount then grown, which necessarily must be much larger at the present time, owing to the



FIG. 15.—FIELD CULTURE OF HERBS AT SUTTON.

great increase in the population of this country, the requirements of our Colonies, and the Continental and American demand.

The average quantities of medicinal herbs supplied to the principal dealers in the London market from Mitcham and other places near London during the years 1843–1845 were :

Aconite plant	21 cwt.
Angelica root	12 cwt.
Belladonna plant	6 tons.
Chamomile flowers	4 tons 16 cwt.
Henbane plant	20 tons.
Liquorice root	15 tons.
Poppy capsules (whole)	950,000.
Poppy capsules (broken)	4 tons.

Red Rose petals	2,200 lb.
Rhubarb root	20 tons.
Savin	25 cwt.
Stramonium plant	22 cwt.
Wormwood	1½ tons.

Since that date the cultivation of peppermint, lavender, belladonna, aconite, and rhubarb has largely increased, but no figures are available relating to the amounts at present grown in this country. Some experiments made in Canada and the United States show that several of the above plants cannot be successfully or profitably grown in the American Continent. Peppermint, however, is now grown to an enormous extent in the United States, and the oil is even imported into this country, chiefly for purposes of confectionery, the English oil of peppermint being mostly used for medicinal purposes. The English oils of peppermint and lavender are still regarded as being of finer flavour than those of any other country, and are exported to all parts of the world, and everywhere obtain the highest price. As a rule English drugs command a higher price than those grown elsewhere, with the single exception of rhubarb root, which is always cheaper than that imported from China. The reason of this is that no traveller has yet succeeded in bringing to Europe roots or seeds of the plant which yields the finest rhubarb root of that country. The species already brought from China, viz. *Rheum palmatum* and its variety *Tanguticum*, *R. Collinianum* and *R. officinale*, all yield roots differing in structure and markings from, and are less active than, the finest Chinese root. The species cultivated in this country are *Rheum Rhaponticum* and *Rheum officinale*, and the root is chiefly used by herbalists and exported to the United States.

The cultivation of medicinal plants on a wholesale scale is of comparatively recent date, certainly not earlier than the middle of the eighteenth century, with the exception of lavender, which was apparently cultivated in 1568 at Hitchin, that of peppermint having been begun in 1750 and that of rhubarb in 1777. The regular use in medicine of aconite, henbane, and stramonium dates only from the experiments made by Dr. Stoerck, of Vienna, about the year 1672, although their properties were recognised some centuries earlier, except in the case of belladonna, the first description of which as a distinct plant appeared in the "Grand Herbar" published in Paris probably about 1504.

Besides the plants enumerated in Mr. Squire's list, a few others are grown to a lesser extent, including the squirting cucumber (*Ecballium Elaterium*), wild lettuce (*Lactuca virosa*), and rosemary (*Rosmarinus officinalis*). It has been found worth while even to cultivate foxglove (*Digitalis purpurea*) and hemlock (*Conium maculatum*), for although both plants are locally abundant, the cost of carriage by rail, and the delay in delivery causing alteration in the active constituents of the plant by heating, have shown that it is cheaper to grow them, and manufacture preparations on the spot. In this way the plants can be chopped up and ground by machinery, and the juice expressed by hydraulic pressure within twenty minutes after the cart has brought them from the field to the factory, and within forty minutes afterwards the juice can be evaporated in steam-heated pans to a solid extract.

THE SOCIETY'S GARDEN AT WISLEY.

By THE SUPERINTENDENT.

[Lecture given on July 18, 1905.]

THE noble gift of Sir Thomas Hanbury has been, and is being, so much visited by the Fellows that any description would seem needless, but of the ten thousand Fellows of the Society a considerable number have



FIG. 16.—VIEW IN THE GARDEN AT WISLEY.

not yet been able to see the Garden, and those will be able to form some idea of the beauty of the Garden from the lantern pictures to follow, and all will feel grateful to the donor of the Garden for his most valuable gift. A great advantage is that at no time can the Garden ever be built in, as it is nearly surrounded by a charming common covered with Scotch Pines, Heath, Gorse, and Broom, and at practically all seasons of the year the drive from Weybridge is very attractive, and always greatly admired by visitors. It is very curious and interesting to know that in the early seventies the Council of the Society were looking out for a new garden, owing to the polluted atmosphere at Chiswick, excessive drainage, &c.,

and the late owner of the Wisley Garden, G. F. Wilson, Esq., informed them that there was a site at Wisley that might suit their purpose, and although they did not get the Garden then, thirty years afterwards the Society were so fortunate as to obtain it as a gift, with all the work of the late G. F. Wilson added and developed. The Natural Garden, so well planned and beautiful, we are keeping the same as it was at Mr. Wilson's death, as it would be very difficult to improve it. In the early part of the year Trilliums, Erythroniums, *Narcissus cyclamineus*, Primroses are flowering, followed later by *Lilium rubellum*, *Lilium giganteum*, &c., all of which succeed famously under the trees; in fact, the two *Liliums* named are superb in the shade. The reason is probably



FIG. 17.—ALMOST THE SAME VIEW AS FIG. 16 IN EARLY SPRING.

that the fallen leaves are allowed to lie on the ground instead of being raked off, and thus a natural food is annually supplied to the plants.

Fig. 16 shows a somewhat damp situation in the Garden, where *Ericas*, *Pernettyas*, *Phormium tenax*, and similar plants thrive splendidly. The *Phormium* has leaves about eight feet long and is growing in the wettest place, a position it likes. In fact, in another part of the Garden it grows vigorously in a wet bog without any protection in the winter. In amongst the *Ericas* is *Primula rosea*, and quite near, under the shade of overhanging branches, are *Shortias* and the difficult *Epigaea repens*, both of which rejoice in a cool, shaded spot, with a peaty soil to root in.

Fig. 17 is another view of the same place with *Andromeda floribunda* and *Bryanthus empetrifolius* in bloom, a charming little plant which is not so much known as it deserves.

Fig. 18 is one of the prettiest views in the Garden : the ponds filled with Water-lilies, the rustic bridge nearly covered in the spring with *Wistaria multijuga*, with its tassels of blossom two feet long, and a clump of *Abies pungens glauca*, *Cupressus macrocarpa*, and other conifers in the distance give a most pleasing effect. Just beyond (fig. 19) are some rustic steps that are always admired in the early months of the year, as all amongst the stones are growing Primroses, hardy Cyclamens, small Ferns, and similar plants, making it difficult to use the steps without treading on flowers or foliage. This again is under the thick shade of deciduous trees ; all the banks on either side of the steps we have recently planted with good British Ferns, which are now looking very well.



FIG. 18.—ONE OF THE PONDS.

It would probably be impossible to get Water-lilies to grow and flower more freely than they do in the ponds at Wisley (fig. 20), and as there are so many trees close to the water, their leaves falling into the ponds may have something to do with their success ; but probably the sheltered position, shallow water, and full exposure to the sun, thus getting warmer than is possible with deeper or larger sheets of water, are answerable for not only the freedom and size of the flowers but also for their extraordinary earliness every year. On the margins of these ponds are planted *Iris Kämpferi*, *Saxifraga peltata*, *Osmundas*, *Spiræas*, and similar moisture-loving plants, which always bloom splendidly. In fact, fig. 21 shows how well these do when they can get their roots into water.



FIG. 19.—RUSTIC STEPS IN EARLY SPRING.



FIG. 20.—WATER-LILIES AT WISLEY.

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Reference has been made to the Wistaria on the bridge over one of the ponds, and its surroundings of Rhododendrons and other flowering shrubs must be seen to have any idea of the effect. One tree is especially worthy of note, viz. *Cedrus atlantica glauca*, which is not only the most graceful of all glaucous conifers, but as seen at Wisley, with a background of green combined with a groundwork of scarlet-flowered Rhododendrons, a picture is made not easily forgotten.

Fig. 22 shows one of another series of ponds, having a small island in the centre, on which the elegant *Alnus laciniata imperialis* is a striking object, and for planting in a wet position this tree has probably no equal for beauty. On these ponds the *Villarsia nymphaeoides*



FIG. 21.—END OF POND, SHOWING THE GROWTH OF TREES AND PLANTS.

is a great pest, crowding out most aquatic plants, and although it is pretty in both leaf and flower, it is not a desirable plant to introduce. The margins of these ponds are covered with herbaceous Lupines, *Iris Kämpferi*, and *Iris sibirica*. The figure shows these Irises with Weeping Willow, varieties of Cornus, and other suitable plants, while on the side of another pond there are various forms or varieties of the Bog Myrtles, *Myrica asplenifolia* being the most ornamental and the sweetest.

Where there is sufficient space for a large plant by the side of water, *Gunnera manicata* is unsurpassed; its bold foliage is very imposing. Several leaves at Wisley last year were over seven feet across. This year



FIG. 22.—ONE OF ANOTHER SERIES OF PONDS.

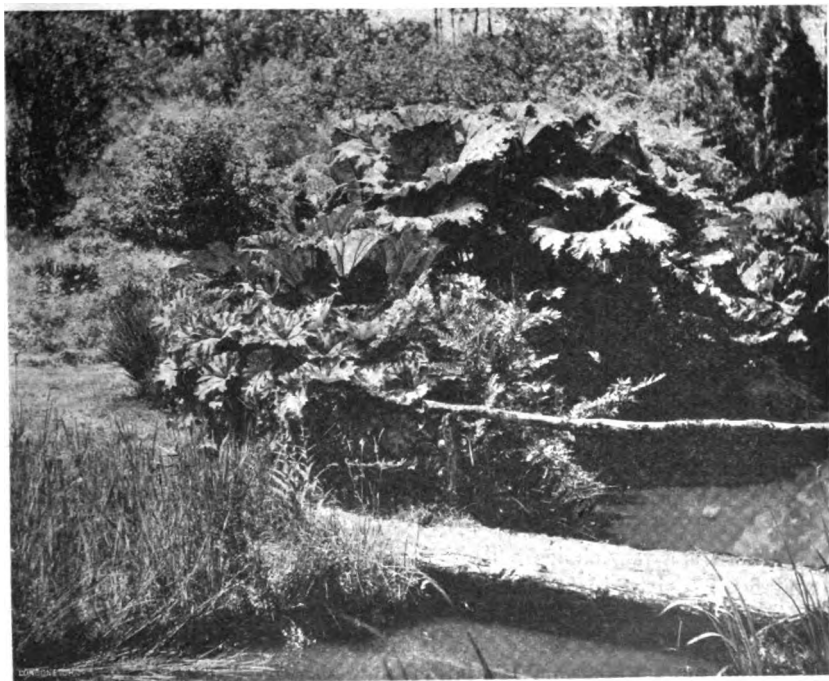


FIG. 23.—GUNNERAS AT THE MARGIN OF A POND.

they will scarcely grow so large, as the plants were cut by frost on May 28, in spite of protection. This plant is not quite hardy, and immediately the foliage dies down the crowns should be protected in winter with bracken, heather, straw, or similar material, which should not be removed too early in the spring. We have (fig. 28) a view of the *Gunneras*, both *manicata* and *scabra*, with *Osmundas* growing amongst them, thus adding to the whole a lightness that was necessary.

In fig. 24 we have a more complete view of the island, with the *Alnus*, *Retinospora squarrosa*, *Gaultheria Shallon*, and other low-growing plants seen to advantage.

Iris orientalis (fig. 25) as grown in a mass at Wisley is a most telling sight, and will grow very well in a fully exposed or partially shaded, wet



FIG. 24.—SHOWING ISLAND IN THE SAME POND AS FIG. 22.

or dry, position; although it does best in a damp place. It may be described as a "glorified *Iris sibirica*," but taller and more floriferous.

Nothing excites so much admiration as the Weeping Cherry—*Cerasus sinensis pendula*—when in blossom (fig. 26). The habit is perfect, and the blossoms are so abundantly produced that the tree appears to be a cascade of pale pink, and of all weeping trees none can surpass, if equal, this.

There is a very choice collection of *Nymphaeas* in most of the ponds, and fig. 27 gives some idea of how well they succeed in the shallow water with a mud bottom. No one variety can be said to be better than another, as all thrive equally well, but this year the flowers are not only more numerous but larger than usual. As there is no lime in the soil, all such plants as *Rhododendrons*, *Kalmias*, *Ericas*, *Ledums*,



FIG. 25.—*IRIS ORIENTALIS* GROWING IN A MASS.



FIG. 26.—*WEEPING CHERRY*.

Pieris (better known as *Andromeda*), the sweetly scented *Clethras*, *Per-nettyas*, and *Gaultherias*, all grow famously, as seen in this picture. In addition to these we have been able to plant during the past winter and spring, through the great generosity of many nurserymen, a remarkably fine selection of flowering and ornamental foliage shrubs. These have all been planted in groups, so that visitors may see varieties growing side by side, and make their own selection if they wish to plant. A large bank has been planted with broad grass paths amongst the groups, and in a few years this should prove a most interesting portion of the Garden. Again, a field that was under cultivation by the river Wey—which is one of the boundaries of the property—has been sown with grass seeds and



FIG. 27.—WATER-LILIES AND VARIOUS PLANTS ON THE BANK OF THE POND.

planted with choice ornamental deciduous trees, and in a few years they will be another feature of the Garden. Later on it is hoped that Conifers and other trees may be added, as there is plenty of land available belonging to the Society. That they would succeed splendidly is unquestionably proved by the tree growth on the commons adjoining; in fact, soil, position, atmosphere, and all other desirable elements are favourable to tree life in an eminent degree.

In another part of the grounds, now partly laid out, it is proposed to make a Rose garden, containing most of the species. In this part there is a fair amount of clay mixed with the soil, and the position is sheltered from all cold winds, yet free from shade, and altogether very suitable for such a garden, and would prove an attractive feature to all Rose-lovers:

and who is not? As the Society owns about sixty acres of land, there is ample space for all the improvements and additions suggested, but the work will of necessity be spread over a number of years.

Leaving this part of the work, we will turn attention to the recently erected glass structures (fig. 28), excellently built, light, strong, and with all modern improvements, and so situated that, while getting all the sun possible, they are very little exposed to wind, as they are partly below the ground level, the sloping ground having necessitated a certain amount of excavation. The house furthest from the spectator is a propagating-house with a centre path, and heated chambers on each side for bottom heat, so essential in propagating. The next is a hardening-off house with raised solid beds on either side of a centre path. The

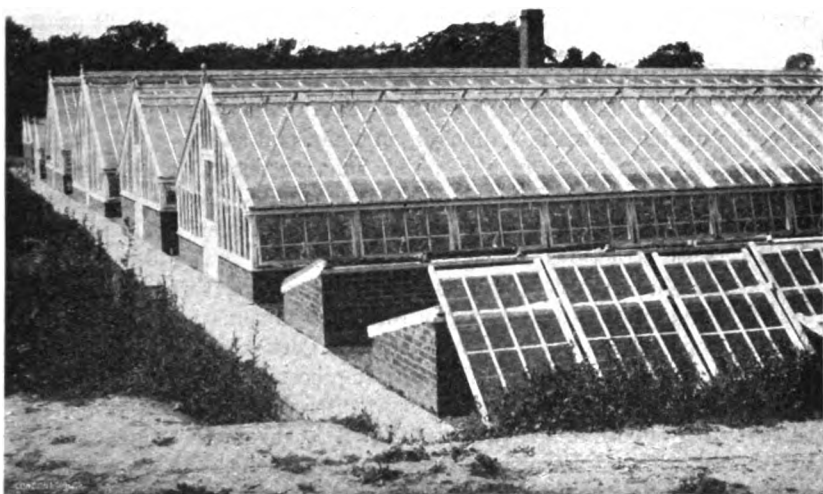


FIG. 28.—RANGE OF GLASS HOUSES.

third is a house adapted for trials of Cucumbers, Melons, and Tomatoes. We have already in this house a trial of Tomatoes which promise well. Then comes the house which contains the famous collection of Figs which the Society were many years in getting together, and one may say, without any hesitation, that the collection is not surpassed, and very probably not equalled, by any other collection of Figs in the world. All the plants are grown in pots, and when the young growths have made five leaves the point is pinched out, thus causing the embryo fruit in the axils of the leaves to swell and develop into large fruits. If any of you have barren Fig trees, this method of compelling them to fruit can be recommended. Both this house and the next are 100 feet long by 30 feet wide. The latter is in three divisions, and during the coming winter will be planted with Vines, one division for early, one for mid-season, and one

division for late Grapes, one Vine of each variety. The walls are built on arches for inside and outside borders.

The next house is intended for plant trials, and should prove an excellent house for the purpose. In the centre is a raised bed with side stages all round. The last house is intended for Peaches and Nectarines, one division to be planted out and the other division for trees in pots, thus making it as instructive as possible. In addition to these houses there are three frames, each 100 feet long, two of which are heated and one is a cold frame. All the glass houses were erected by Messrs. Richardson & Co., of Darlington, and the heating was done by Messrs. Kinnell & Co., of London, and in both cases the work has been carried out in a very satisfactory manner. The boilers are known as the "horizontal tubular." All the houses are well heated and well adapted for the purposes they are intended for. Close to the glass structures is an excellent bothy for four young gardeners, and there is a very good library of books dealing with practical and scientific horticulture for the use of the students and staff. The house used by the late Mr. Wilson is occupied by one of the foremen, and another house has been built for the other foreman. A good water supply has also been made by sinking a large well, from which water is pumped up into a great tank, higher than the top of any building on the place. The pump is capable of pumping up ten thousand gallons in an hour, and as the supply is good there is little likelihood of the water running short. From the tank mentioned pipes are laid to all the cottages and glass houses in the most convenient manner. In addition tanks have been made in several of the glass structures to catch the rainwater. The drainage has received careful attention, and is so well arranged that it seems impossible for anything to go wrong in this important matter.

The approach to the Garden from the Portsmouth Road has been improved, a large quantity of stone having been put on the drive, and a new entrance has been made; it is now entered through handsome oak gates by the Superintendent's house (fig. 29). From these gates a drive twelve feet wide, of Farnham gravel, has been made. It is intended to make wide borders on either side of this drive, and when this is done a very handsome approach will be made to the Garden proper. Probably the borders will be planted with Tea and Hybrid Tea Roses, as this part of the ground is too light for Hybrid Perpetuals. On either side of the drive, and behind the borders, a hedge or screen will be planted to shut off the vegetable trial grounds, and it may be said that this part of the trial grounds is very poor, and will take some time to get into a really fertile condition. However, by deep cultivation and a liberal application of manure, this will be remedied; and there is this to be said, that all vegetables that are a success at Wisley will be a success anywhere, and for this reason alone it may be an advantage to have a poor soil rather than a rich, fertile one. We have never had such large quantities of Potatoes, Peas, Broccoli, &c., sent us for trial before, and with one or two exceptions all have done or are doing fairly well. As we have plenty of space, a clear unpolluted atmosphere, and are pretty well above the fog-line, we are sure to have much larger, better, and more conclusive trials than were possible in the past.

On the highest part of the grounds, a selection (not a collection) of Apples, Pears, Plums, and bush fruits has been planted, two of each variety. These were generously presented to the Society by various nurserymen, and were planted during the past winter. The sites were all carefully prepared for the trees, and, with the exception of Raspberries, all have done very well. On May 23 we had a very severe frost, already referred to, which killed all the young shoots of the Raspberries, and they are now so weak that it seems unlikely that they will recover. All the varieties of different kinds of fruit are planted in alphabetical order, so that it is easy to find any variety wanted. No one would call it an ideal soil for fruit, as it is so light and sandy, shallow, and resting on sand and gravel; yet in spite of that, by judicious feeding and keeping a loose



FIG. 29.—SUPERINTENDENT'S HOUSE NEAR THE ENTRANCE TO THE GARDEN.

surface soil, there is no doubt that we shall be able to grow creditable fruit, and here again is probably an advantage, as it is hoped that we shall be able to show how fruit can be grown on even poor soils without any heavy expenditure. It should, however, be understood that we have not planted any Cherries, as the soil, we think, would be too light, sandy and hot for this fruit. Later on we may plant some lower down the slope of the hill, where the soil is deeper and cooler.

On the highest part and the most exposed position a very fine Meteorological Station has been established (fig. 30), where the rainfall, the direction and velocity of the wind, the number of hours of sunshine, the temperature in the shade, in the sun and on the grass, and at 1, 2, and 4 feet below the surface of the ground, and the humidity of the air, are recorded daily, and reports sent to the horticultural press and the

Meteorological Society. Experts say this is one of the finest stations in the country, and as many Fellows are interested in meteorological returns, and ask to see our instruments, this will not be one of the least parts of the work going on.

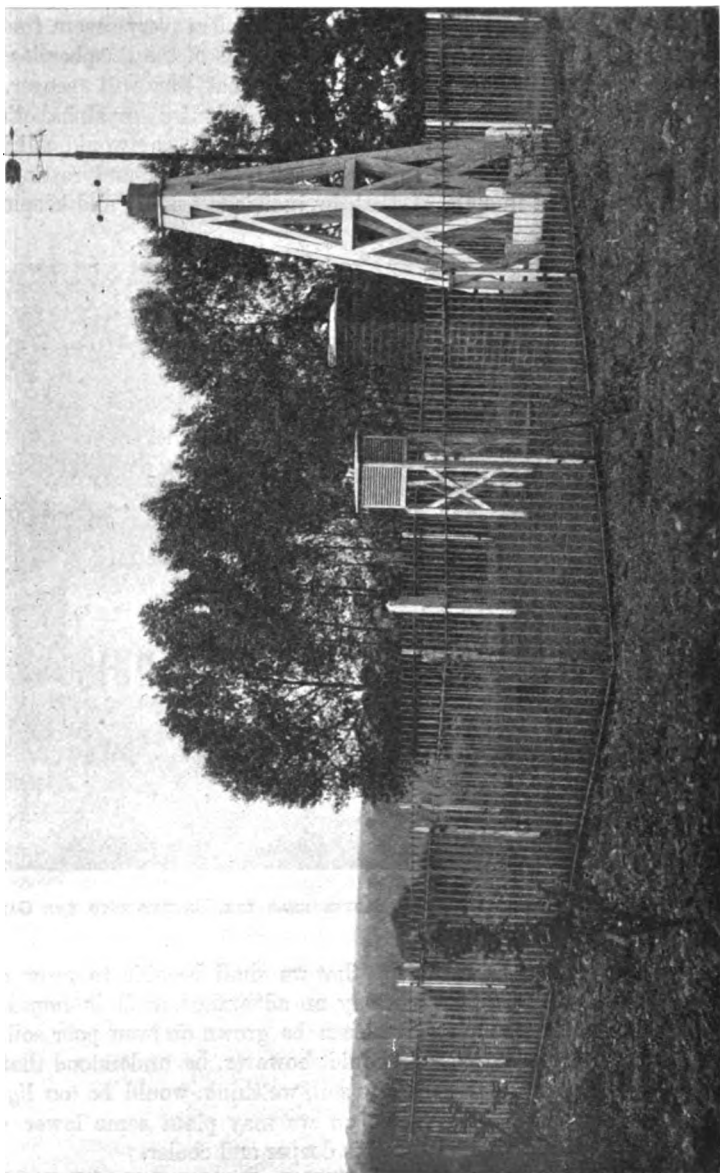


FIG. 30.—THE METEOROLOGICAL STATION.

The question is very frequently put: What is the best time of the year to see the Garden? This is not an easy question to answer, because that which *one* may admire most may be of no interest to *another*, and the best way, perhaps, will be to state briefly what there is to be seen in

different months. In January we have Snowdrops, Aconites, Christmas Roses, Primroses, and similar flowers in great quantities. In February we have all the flowers mentioned in January with the addition of the Glory of the Snow (*Chionodoxa*), early Crocus, *Scilla sibirica*, and many forms of *Cyclamen Atkinsii*. All these are excellent at Wisley, and are planted on mounds or similar positions where they are never disturbed and have perfect drainage—a point of much importance. About March the *Cyclamen coum* and *Cyclamen vernal* are lovely—the best plants growing by the sides of rustic stone steps—and with these and big plants of Primroses these steps are charming all through March and part of April. Other plants or bulbs in flower during March are the early-flowering Narcissi; one specially worthy of mention is *N. cyclamineus*, grown under the shade of deciduous trees where the leaves are allowed to lie and rot. The flowers are not only numerous but of great size, proving that this variety likes shade and leaf-mould. A few early Tulips, *Helleborus orientalis* or Lenten Rose, *Anemone fulgens*, and that charming shrub *Pieris japonica*; on one of the ponds the beautiful *Aponogeton distachyon* fills the place with its delicious Hawthorn scent; but with the advent of April and May no writer or speaker could do justice to the display of all kinds of flowers usually found in gardens. Water-lilies of many shades begin flowering freely; trees and shrubs are clothed with foliage and flowers, and bold masses of Narcissi, one variety only in a mass; Anemones in great variety, especially *nemorosa Robinsoniana*; large clumps of Primroses and Polyanthus, and in the ditches and moist places *Primula japonica* in rude health, with flowers ranging from pure white to deepest purple; Tulips in many colours, Erythroniums, or Dog's-tooth Violets in many varieties blooming profusely under trees; also Oxalis in many colours, and the American Wood-lily, of which the best is *Trillium grandiflorum*; and for growing under trees it is questionable whether this plant has any equal.

Towards the end of the month of May and through most of June the Azaleas and Rhododendrons are a blaze of colour, and well worth going a long distance to see. Nearly all the varieties are choice ones, selected by the late Mr. Wilson, and planted carefully with a view to colour effect. Amongst the Azaleas are planted *Lilium auratum*, *lanceifolium*, *pardalinum*, &c., some of which flower at the end of June, but the Lily that produces the finest display in June is *giganteum*, which grows eight to ten feet high under deciduous trees, but only three to four feet high in the sun. *L. Szovitzianum* is splendid either under trees or out in the open, and continues in flower through nearly the whole month. *L. rubellum* and *L. Hansonii* are two of the most charming varieties that flower freely in the shade, and are greatly admired by visitors in June. The remarkably fine Wisley collections of Pæonies and Irises are also at their best during the month. This year, unfortunately, the former were seriously injured by the late frost, but, having made excellent growth, they should be a feature of the Garden next June.

From about the last week in June and through the major portion of July, the *Iris Kämpferi* are a wonderful sight by the lake-sides. They are allowed to grow naturally with long grass amongst them, and though some of the flowers are somewhat small, they seem perfectly

at home. During July the Water-lilies are at their best, the Iris at the margins and the Water-lilies in the ponds make a charming picture, and those who pay a visit to see these flowers in July will not consider their time wasted. In the Wild Garden this is the chief feature, but in the trial parts the collections of Violas, Carnations, and Phlox are very good, and admirers of these flowers can easily make up a selection of varieties to grow in their own gardens. In some of the borders *Ixias*, *Brodiaeas*, and *Calochortus* flower exceedingly well; the hot, light soil evidently suiting them famously.

In August the Michaelmas Daisies, Dahlias, &c., begin to be showy, and go on until stopped by frost; but one of the finest things in the Garden during August is *Gentiana asclepiadea* in all its shades of blue, also the white form. This Gentian grows in the grass under trees, through small shrubs, in fact everywhere, seeding itself in all sorts of unlikely places, and when in full flower the effect is most natural and beautiful. It seems to thrive equally well on a dry bank or by the side of a pond, and is one of the most accommodating plants possible for a wild garden.

After September comes in, flowers naturally decrease, but this is made up for by the glorious autumn tints, and the finest foliage tree at this season is the *Liquidambar styraciflua*, with its brilliant crimson foliage. In some places this fine tree grows rapidly and is in the best of health, but never puts on the desired rich colour in the autumn. This is because the tree is not planted in a sufficiently moist place; at Wisley we have trees in a dry place and others in a fairly moist spot, and the difference in the colouring is remarkable, although the growth is exactly the same. The Bird Cherry—*Cerasus Padus*—is one mass of gold in September at Wisley, and quite as beautiful in the autumn with its foliage as it is in the spring with its flowers. There are quite a host of fine foliage plants, trees, and shrubs, well worth the Fellows going to see in September and October, and even in November and December the Garden is full of interest; but if any time is better than another we should say that it was during April, May, and June, the Garden being the gayest during those three months.

There still appears to be some doubt as to the best means of reaching the Garden. To those who have to travel on the London and South Western Railway main line, Byfleet is the nearest station, being three miles away, and conveyances can always be found there. Weybridge, also on the main line, possesses a better train service, but it is over five miles away, and cab-hire is more costly than from Byfleet. There is also a fairly good service from Windsor to Byfleet. Anyone going *via* Leatherhead or Guildford should book to Horsley Station, which is about three-and-a-half miles from the Garden, and conveyances can nearly always be obtained at that station. Fellows possessing motor-cars find the Garden easy of access, as it is only about three hundred yards from the famous Portsmouth Road, one of the finest motoring roads in the kingdom. The average number of Fellows and their friends is about fifty a day—the maximum being over two hundred in one day—which proves that the splendid gift of the Garden by Sir Thomas Hanbury to the Society is well appreciated. The privilege of admission is, as it always has been, confined to Fellows of the Society and friends introduced by them.

BRITISH FERNS AND THEIR WILD SPORTS.

By C. T. DRUERY, V.M.H., F.L.S.

[Lecture given on August 1, 1905.]

ON a former occasion when I gave a lecture on our native ferns in the Drill Hall I treated the subject in a general fashion, giving by lantern slides an imaginary glimpse of the dense forests of ferns and their allies, which in ages inconceivably distant built up the coal measures which now form one of the main staples of Britain's prosperity; passing thence I went on to the details of their reproductive peculiarities and marvels, including the latest discoveries of the abnormalities which occur therein and concluding with a series of slides illustrating a number of natural "sports" and their progeny as improved in type by selection. To-day I purpose confining myself mainly to these natural sports with a view to impressing upon my hearers four things, viz.:

1. The long-standing botanical absurdity of classing all marked and ornamental fern varieties as "garden" forms and therefore unworthy of observation.

2. The peculiar richness of the British Isles in natural, i.e. wild sports, of extremely divergent character and often of great beauty.

3. The unfounded nature of theories that cultivation is the main essential in variation in this class, and that these sports are induced by any response to environmental influences.

4. The fact that, after a long period of neglect by the botanist proper, it is now recognised in some of the highest quarters that this particular domain of natural variation constitutes a rich field of research, as is evidenced by the numerous papers contributed in the first place by Prof. Bower, Dr. Lang, and myself, and more recently by Prof. Farmer and Mr. Moore, whose researches have even demonstrated that the study of abnormal fern phenomena may contribute to the benefit of humanity by the discovery of a singular physiological resemblance between the abnormally reproductive cell-growth of aposporous ferns and that of the dreadful disease cancer, which is an undoubted step in the recognition of the true nature of the latter.

Finally, in this connection, Prof. Hugo de Vries's recent publication on the Theory of Mutation tends to prove what I have long believed to be the case, viz. that such sports may have played an important rôle in the evolution of the species. The limited time at my command precludes me from entering into many details establishing these several points, and it will furthermore make matters clearer if I start at once with the lantern slides and use these various points as the basis of my remarks upon the specimens exhibited, reserving to myself to bring those remarks together subsequently in a more concrete form for the full report of the lecture in the Society's JOURNAL.

I may, however, point out that it is obviously absurd to characterise as garden forms varieties most of which have sprung into being, how we know not, on wild moors, in secluded glens, shady lanes, and even by dusty roadsides, devoid entirely of cultural influences, especially since the majority of the finest forms in cultivation have thus originated and many of the rest are their direct descendants, the spores of the wild specimen yielding progeny of a more advanced type in the first generation raised. Examples of these will be shown later on. The richness of the British Isles in these natural sports is evidenced by the fact that more than 1,200 wild finds are catalogued as distinct, though we have only some forty odd species and the majority of these have sported sparsely. That these sports are not responses to environmental stimulus or change is obvious from their occurrence on hill and mountain sides and elsewhere where the environment has obviously been unchanged for centuries, to say the least, and from their closely mingled association with innumerable normal forms of their own species which are entirely unmodified, though their environment is absolutely identical.

Referring now to my lantern slides, the diagrammatic life cycles of ferns shown on the screen, reproduced from Prof. F. O. Bower's originals, show that among these sportive forms not merely the outward form has been modified, but also, to a very remarkable degree, the life cycle itself, the normal roundabout mode of reproduction through the spore being short-circuited as it were in almost every possible way; the subsequent discovery by Dr. Lang that the prothallus, or tiny green scale produced from the spore as a preliminary to sexual action and the formation of a seed, could itself produce spores direct, completing the apparent possibilities in this direction. The series of slides which follow shows first of all a number of typical wild finds of the contracted, cristate, plumose, and cruciate characters, among the last of which *Athyrium filix-femina* *Victorica*, shown in detail and here reproduced (fig. 31), is seen to be undoubtedly the most extraordinary fern sport yet discovered. *A. filix-femina* *cristatum Kilrushense* (fig. 32) represents the most extreme type of cristation yet found wild; this was found by myself in a drain cutting at Kilrush, Ireland. The various forms of *Polypodium vulgare* exhibited were all wild sports, and afford in each case remarkable examples of sudden deviation from the normal type, coupled with constant reproduction of the varietal form. Fig. 33, *P. v. cornubiense, elegantissimum*, is one of the more striking and is peculiar in a tendency to partial reversion and the production of three types of frond formation, viz. normally pinnate, quadripinnate, and an intermediate type, portions of all of which may occur in one frond.

Pteris aquilina cristata, which covers some acres of ground at Faygate, Sussex, affords an example of how such sports are occasionally able to establish and extend themselves on specific lines, presumably by ousting the normal. Fig. 34 shows a detached portion of this variety and also portions of two very distinct and dissimilar varieties which were growing in the immediate vicinity accompanied by the normal and a liberal admixture of the cristate form, a curious example of diverse variation under identical environment. Typical forms of ten different species are shown, but had time permitted examples could have been

displayed of the great majority of the British species, some of which have yielded hundreds of distinct types to the fern-hunter. Finally, as

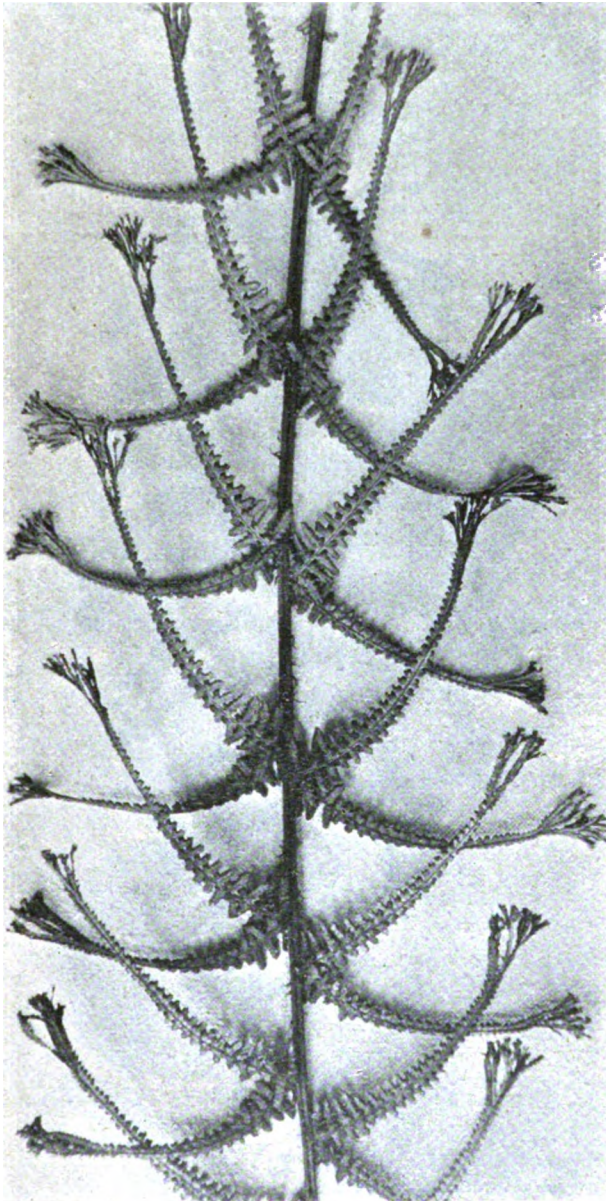


FIG. 31.—*ATHYRIUM FILIX-FEMINA*, VAR. *VICTORLE*.

regards the slides, I show a few examples of the results obtained from these wild finds by selective culture, and it is very noteworthy in this connection that the finest of these have exhibited the wonderful results

shown in either the immediate progeny of the wild find itself or in at most three subsequent generations, and hence are not, as is usually



FIG. 32.—*ATHYRIUM FILIX-FEMINA*, VAR. *CRISTATUM KILRUSHENSE*.

the case, the result of long-continued accumulation of gradual improvements. The pedigree slides show this in the clearest possible manner. The last slide, representing my fernery at Forest Gate, demonstrates

unmistakably the immense decorative value of British fern varieties and speaks for itself.



FIG. 33.—*POLYPODIUM VULGARE*, VAR. *CORNUBIENSE ELEGANTISSIMUM*.

Inexorable limits of time precluded me from entering into several points in my notes. I avail myself of this opportunity to deal with them, as they form an essential part of the lecture. In the first place, the beauty

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of a variety is altogether independent of the botanical interest inherent in the fact that the fern has suddenly departed from its ancestral habit of growth and adopted an entirely new plan, whether merely eccentric or symmetrically beautiful matters not in this connection. Some of the inconstant forms, indeed, are in this respect more interesting than the constant, since in them we see the evidence of a sort of conflict between the varietal and normal forces, each of which occasionally obtains the mastery. In hybrid plants we can to some extent understand this, since we know that two specific forms are fused or rather mixed in the blood, and from Mendel's and others' experiments it appears that the alliance is always subject to dissolution at the critical reproductive period.

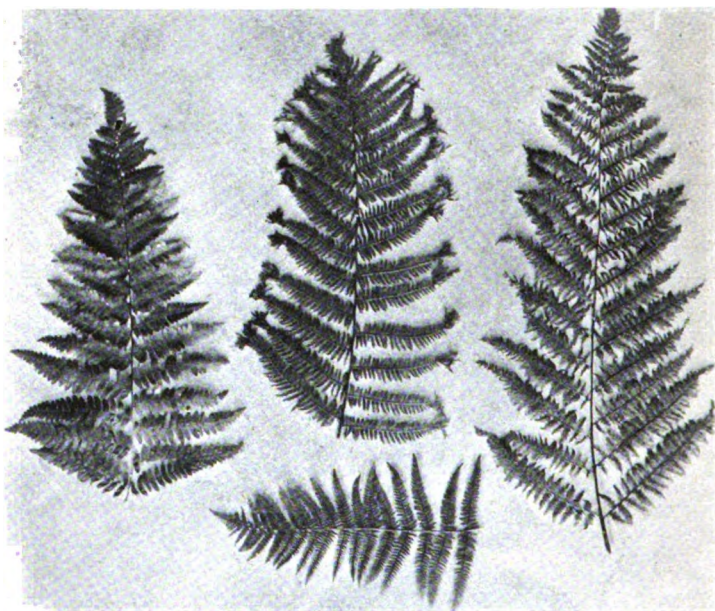


FIG. 34.—*PTERIS AQUILINA CRISTATA*.

In fern varieties, however, we have to do with a pure species, an individual of which at some period has formed, as it were, a new architectural plan, which in constant sports is thenceforth strictly adhered to, for the progeny, when they vary again, only vary in the extent of development of the new type, or, in inconstant sports, is apt to be replaced partially or wholly by the old one. The reason of these sudden changes is utterly unknown to us; none of the theories advanced so far will hold water when confronted with actual facts, as regards nature of habitats and environment generally, as indeed I have already stated. Wherever ferns are abundant, the assiduous hunter finds these "sports" mingled with hosts of the common types, and search for any of the intermediate type which may suggest gradation is invariably vain. To all intents and purposes they are "special creations," and considering the

numbers which have been discovered and are still being discovered, the immense area of ferny ground which is still unexplored and presumably as prolific, and the great range of variation they present, it would be indeed a strange thing if, in the æons of time which are demanded for the great scheme of Evolution, none of these should ever have had sufficient self-assertive power to spread far and wide and become a species proper.

A species is but a constant variety of a genus, and if its form be permanently changed who can draw a line between it and its congeneric fellows, and deny it a specific title? In the exotic asplenia, to take a familiar instance, we have numerous recognised distinct species which differ far less between each other than do many of our British sports. These sudden "sports," as we know, are not confined to ferns; they occur in all branches of organic life. Among animals, marked "sports" in cattle have proved to be so prepotent as to breed true with the normal type, and it is very probable that apart from outward structure, there may be what may be termed constitutional sports, involving greater hardiness or tenderness, or even, in animals and insects, different proclivities and habits, so that the sudden appearance of new pests and diseases, or the sudden predominance of old ones, may well be due to "sports" of this kind in the organisms which constitute them. Without, however, entering farther into these somewhat abstruse regions of the subject, I venture to think that we may congratulate ourselves that the days when such "sports" were regarded as mere natural freaks, unworthy entirely of scientific notice, are passing away, and that it is now appreciated that they present a valuable and inexhaustible field of profitable research.

NOTE.—It was impossible to reproduce as illustrations to this lecture all Mr. Drury's slides.—ED.

TREES FOR TOWNS.

By R. LEWIS CASTLE.

[Lecture given on August 29, 1905.]

It is now generally recognised that until comparatively recently the cultivation of trees in towns has been sadly neglected, but it is also felt that from an artistic, as well as from a sanitary point of view, this state of things should not be allowed to continue. Though there are indications that the matter is receiving more consideration from public bodies than formerly, the progress is deplorably slow, and something can yet be said on the subject, it is hoped, with a prospect of improving the present condition of affairs.

Undoubtedly there are many impediments which only time and extensive alterations in the design of cities can remove. For instance, our forefathers seemed to delight in narrow streets and in crowded gardenless houses, and this too when land was cheap and more easily obtained than it is at the present time. The undoing of such mistakes has cost many thousands of pounds, and added heavy burdens to the ratepayers, but no form of public expenditure has yielded better results or more lasting satisfaction than that devoted to the widening of streets and the provision of ample open spaces for the people.

The excellent work performed by the London County Council in this direction merits the highest commendation, and an admirable example has been set for provincial towns to follow. The appreciation that such work receives will certainly lead to extended efforts in the future, and these should be made upon the lines which experience has shown to be the most desirable. The remarks which follow are founded upon a long acquaintance with the parks and gardens of the metropolis, and those of many other large cities both at home and in France and Belgium. But they have especially arisen out of a close examination of the London parks, open spaces, and squares, during the summer and autumn of last year. From the extreme west, where we have Royal Kew, proving by the wonderful collection of trees and shrubs that flourish there, how great and varied is the beauty that can be imparted to parks and gardens, to the densest parts of the east of London, where Victoria Park affords a remarkable example of tree-growth under most adverse conditions; from the northern heights of Highgate and Hampstead to Sydenham, Nunhead, and Peckham on the south, all the larger spaces where trees are grown, or could be grown, have been carefully examined as regards their soil, their cultivation, and the kinds of trees grown in them. Much was seen that was worthy of praise in a high degree, many examples were afforded of the efforts that are being made to get rid of existing defects, and if there were instances in which criticism seems necessary, it is not in any carping or contentious spirit that they will be pointed out, and as

these cases will not be particularised no harm can be done, while the lesson is open for all who wish to learn.

Certain general defects cannot fail to strike any observer who sets himself to investigate the conditions of tree cultivation in London, and the most conspicuous of these is the monotonous repetition of a few types in every direction. Planes, limes, and poplars preponderate very largely, and few attempts are made to increase the diversity either by trial or inquiry. Obviously in extensive avenue planting, or the laying out of new parks and spaces, attempts at experiments with untried trees on a large scale might lead to disastrous results, the risk of which would deter any public body from entering upon them. Yet in the Royal parks, and in those under the control of the London County Council, many trees could be planted and their behaviour watched before employing them generally. To a comparatively small extent this is done in a few instances, but too restricted in manner, and too spasmodic or irregular in its execution at present, to be of much value. This should be more especially part of the regular work of the Parks Department of the London County Council, but something no doubt would depend upon the recommendations of the various superintendents, who, I believe, have the power to draw up an annual requisition for plants &c. which they require.

Victoria Park forms one of the most instructive spaces in the metropolis, first because the collection there is far superior in the number of different kinds of trees grown in it to that of any other park in the London district; and secondly, because the atmosphere and soil conditions are of such an adverse character that trees which can exist and flourish there, might safely be planted in any ordinary town. Over 500 species and varieties of trees and shrubs may be found there, and many of the trees would be a credit to any public or private collection. In the course of my investigations nothing afforded me greater surprise than the varied and interesting character of the Victoria Park Arboretum. Why some of the large western parks cannot be improved by introducing greater variety in their plantations it is difficult to understand, especially when there are so many points in their favour.

Even in the case of species of trees which have been long proved to be adapted for town cultivation it does not seem to be generally recognised what numbers of distinct varieties can now be obtained, some of which show greater differences in foliage, form, and habit of growth than distinct species of the same genus. Four examples of this are afforded by the common sycamore, by the Norway maple, the common ash, and the so-called acacia (*Robinia pseud-acacia*). Of the last-named the Kew Arboretum contains no less than thirty-four varieties, and though all these cannot be said to be worthy of cultivation, quite a dozen very distinct forms could be selected. As regards the ash, the same establishment has twenty-eight varieties, and some of these are both elegant and distinct. Of the sycamore fourteen varieties, and of the Norway maple fifteen forms, are grown, many being much superior to the common type as ornamental trees. This will serve to illustrate one way in which more variety could be introduced into town parks and gardens, without taking so much risk as in planting untried species.

A word must be said in reference to the improved cultivation of trees in towns, as it has an important bearing upon the subject. Apart from the difficulties in the way of success caused by an atmosphere laden with various impurities that check leaf action and development, it often happens in towns that the soil is most unsuitable. In some of the London parks and squares instances can be found where the soil has been little better than a rubbish-heap, and where, beyond the annual digging and clearing up, little is ever done to enrich it. As regards street and avenue trees the conditions are rendered still more adverse by restricting the surface round the tree stems for aeration and rain supplies to a square foot or little more. With a stone path on one side and an asphalt or wood paving or a macadamised road on the other it is astonishing how such freely growing trees as the plane and the lime exist and flourish. It imposes a severe strain upon all trees, stunting them in their early years, and often affects their whole after-development.

In most of the parks there is an ample supply of water, yet in many cases it does not appear that full advantage is taken of this in hot dry summers. Newly planted trees are usually watered it is true, but that is by no means an invariable practice, for I have seen hundreds of trees seriously stunted or entirely ruined through want of prompt and constant attention to this essential matter. But many young trees and shrubs which though hardly established are advancing satisfactorily, would be greatly helped by liberal supplies of water, not only at the roots but over the foliage as well. Wherever the position is exposed to dust from the streets, the cleansing value of a generous use of the hose-pipes cannot be too highly estimated. The abnormally early defoliation so common and objectionable in towns would be prevented, and the trees strengthened in their struggle against adverse atmospheric influences. The expense would be a consideration, but it should be recognised as a necessity inseparable from the conditions prevailing in town parks and gardens. Most certainly the outlay should not deter any public bodies from undertaking it; the neglect of such an essential often means the sacrifice of a good deal of previous labour and expenditure, while the only result is public dissatisfaction.

But it is more particularly in reference to manurial assistance that I would now draw attention. We have to depend chiefly upon deciduous trees for general town planting, and the majority of these respond more readily to manurial help than is commonly supposed. When planted in soil that has been suitably enriched by additions of old manure the progress made by young trees is often remarkable; annual top-dressings assist in prolonging this advance, and a well-developed tree is secured in less than half the time that is required under the old methods.

Where manure cannot be readily obtained, decayed leaves and vegetable refuse generally will form a useful compost for addition to the soil. With this might be used a suitable mixture of artificial or chemical fertilisers, or some of the compounds prepared by the leading firms would be serviceable. If the humus furnished by such materials as those mentioned is abundant, I have found that for the majority of deciduous trees and shrubs basic slag at the rate of 2 lbs. to each 10 square yards of land prepared for borders or plantations furnishes a lasting

supply of plant food. With half the quantity of kainit the above is also useful for poor soils deficient in lime, provided rhododendrons are not planted in the same border. Otherwise superphosphate of lime at 1 lb. per 10 square yards and $\frac{1}{2}$ lb. of sulphate of potash are beneficial and safe. All these substances should be added to the soil at the time of preparation prior to planting, or they may be given in the autumn when moving the soil round established trees. As a spring dressing to stimulate lagging growth, either sulphate of ammonia or nitrate of soda at the rate of $6\frac{1}{2}$ lb. per 10 square yards will usually help, but the first has given the best results with deciduous trees and shrubs in my experience. For old exhausted plantations a thorough renewal of the soil is sometimes the only efficacious means.

In conjunction with the healthy vigour induced in young deciduous trees by enriching the soil, the method of pruning requires consideration. It has been too frequently the custom to let trees in towns grow in an unrestrained manner until they were becoming too large, and then they have been cut back in a somewhat reckless fashion, with the result that bare branches or stumps have been unpleasantly conspicuous with dense masses of small growths at intervals. Judicious hard pruning when the tree is young and in good health produces better formed specimens and a more vigorous annual growth. Examples of this can be seen in many avenues of young planes which have fresh growth yearly 4 to 6 feet in length, with leaves double the size of those borne by unpruned trees. The lime and the ailanthus respond in a similar manner to liberal root treatment and hard pruning. One point must, however, be emphasised here: namely, that in pruning the natural habit of the species or variety should receive due attention. Unfortunately there is a marked tendency to reduce all to one standard, a formal conical head, which, though it may offer some advantages, entirely deprives trees of their natural beauty. Geometrical forms and rigid outlines may be admissible under some conditions in gardens of formal design, but if we really wish to render our parks and open spaces attractive by the extension of tree cultivation, it can only be accomplished by avoiding as far as possible all such monotony.

Concerning the trees which are grown in towns and those adapted for trial under similar conditions much might be said; but as this paper is intended to be suggestive rather than exhaustive it will only be needful to point out those that have given the best results, and to indicate the directions in which others should be looked for.

It has already been pointed out that we are mainly dependent upon deciduous trees for town planting. The conifers afford us little help; although a few names are given in the following list, the trees are not reliable except under special conditions. The holm oaks and the hollies are our principal evergreens amongst trees, though we have abundance of evergreen shrubs which will endure a town atmosphere fairly well.

All the trees named in the following lists are to be seen in the Kew Arboretum, which might almost be termed a suburban park now the metropolitan district has so greatly extended in that direction. A large proportion may also be seen in Victoria Park, though naturally it could not be expected that they would be found in such a flourishing condition

there. Still, as regards trees like *Tilia petiolaris*, the specimens are very fine, and the example of *Zelkova crenata* is a good one, though not nearly so large as the handsome example near the Kew Herbarium.

DECIDUOUS TREES.

- | | |
|---------------------------------------|-------------------------------------|
| <i>Acer dasycarpum.</i> | <i>Fraxinus excelsior</i> and vars. |
| „ <i>macrophyllum.</i> | „ <i>Ornus.</i> |
| „ <i>monspessulanum.</i> | <i>Gleditschia sinensis.</i> |
| „ <i>platanoides</i> and vars. | „ <i>triacanthos.</i> |
| „ <i>pseudo-platanus</i> and vars. | <i>Juglans cinerea.</i> |
| „ <i>rubrum.</i> | „ <i>nigra.</i> |
| <i>Æsculus carnea.</i> | „ <i>regia</i> and vars. |
| „ <i>flava.</i> | <i>Laburnum alpinum</i> and vars. |
| „ <i>glabra.</i> | „ <i>vulgare</i> and vars. |
| „ <i>Hippocastanum.</i> | <i>Liquidambar styracifolia.</i> |
| „ <i>Pavia.</i> | <i>Liriodendron tulipifera.</i> |
| <i>Ailanthus glandulosa.</i> | <i>Magnolia acuminata.</i> |
| <i>Alnus cordifolia.</i> | „ <i>tripetala.</i> |
| „ <i>glutinosa</i> and vars. | <i>Morus alba</i> and vars. |
| „ <i>incana</i> and vars. | „ <i>nigra.</i> |
| <i>Betula alba</i> and vars. | <i>Negundo aceroides</i> and vars. |
| „ <i>lenta.</i> | „ <i>nigra.</i> |
| „ <i>lutea.</i> | <i>Ostrya carpinifolia.</i> |
| „ <i>Maximowiczii.</i> | <i>Paulownia imperialis.</i> |
| „ <i>nigra.</i> | <i>Platanus acerifolia.</i> |
| „ <i>occidentalis.</i> | „ <i>cuneata.</i> |
| <i>Carya olivæformis.</i> | „ <i>orientalis.</i> |
| „ <i>tomentosa.</i> | <i>Populus alba</i> and vars. |
| <i>Catalpa bignonioides</i> and vars. | „ <i>balsamifera.</i> |
| „ <i>cordifolia.</i> | „ <i>deltoides.</i> |
| <i>Cedrela sinensis.</i> | „ <i>laurifolia.</i> |
| <i>Celtis occidentalis.</i> | „ <i>nigra.</i> |
| <i>Cercis Siliquastrum.</i> | <i>Prunus Amygdalus</i> and vars. |
| <i>Cratægus coccinea</i> and vars. | „ <i>avium flore pleno.</i> |
| „ <i>cordata.</i> | „ <i>cerasifera</i> and vars. |
| „ <i>crus-galli</i> and vars. | „ <i>Mahaleb</i> and vars. |
| „ <i>Dippeliana.</i> | „ <i>Persica</i> and vars. |
| „ <i>melanocarpa.</i> | „ <i>pseudo-cerasus</i> and vars. |
| „ <i>orientalis.</i> | „ <i>serotina.</i> |
| „ <i>oxyacantha</i> and vars. | „ <i>virginiana.</i> |
| „ <i>oxyacanthoides</i> and vars. | <i>Pyrus Aria.</i> |
| „ <i>pinnatifida.</i> | „ <i>Aucuparia</i> and vars. |
| „ <i>punctata.</i> | „ <i>baccata</i> and vars. |
| „ <i>tanacetifolia.</i> | „ <i>communis</i> and vars. |
| <i>Diospyros virginiana.</i> | „ <i>coronaria.</i> |
| <i>Fagus ferruginea.</i> | „ <i>floribunda</i> and vars. |
| „ <i>sylvatica</i> and vars. | „ <i>lobata.</i> |
| <i>Fraxinus americana.</i> | „ <i>Malus</i> and vars. |
| „ <i>angustifolia.</i> | „ <i>prunifolia.</i> |

<i>Pyrus salicifolia.</i>	<i>Salix pentandra.</i>
„ <i>Sorbus.</i>	<i>Sambucus nigra</i> and vars.
„ <i>spectabilis.</i>	„ <i>racemosa</i> and vars.
<i>Quercus Cerris</i> and vars.	<i>Sophora japonica.</i>
„ <i>coccinea.</i>	<i>Tilia argentea.</i>
„ <i>palustris.</i>	„ <i>dasystyla.</i>
„ <i>rubra.</i>	„ <i>petiolaris.</i>
<i>Rhus Cotinus.</i>	„ <i>platyphyllos</i> and vars.
„ <i>glabra.</i>	„ <i>spectabilis.</i>
„ <i>typhina.</i>	„ <i>vulgaris.</i>
<i>Robinia pseud-acacia</i> and vars.	<i>Ulmus campestris</i> and vars.
<i>Salix alba</i> and vars.	„ <i>glabra</i> and vars.
„ <i>babylonica.</i>	„ <i>montana</i> and vars.
„ <i>fragilis.</i>	<i>Zelkova crenata.</i>

EVERGREEN TREES.

<i>Diospyros Lotus.</i>	<i>Quercus Ilex</i> and vars.
<i>Ilex Aquifolium</i> (Holly and its varieties).	„ <i>Turneri</i> (almost evergreen).

CONIFEROUS TREES.

<i>Cupressus Lawsoniana.</i>	<i>Sciadopitys verticillata.</i>
„ <i>obtusa.</i>	<i>Sequoia gigantea.</i>
<i>Ginkgo biloba.</i>	„ <i>sempervirens.</i>
<i>Juniperus chinensis.</i>	<i>Taxodium distichum.</i>
<i>Larix europæa.</i>	<i>Thuya orientalis.</i>
<i>Picea excelsa.</i>	„ <i>occidentalis.</i>
<i>Pinus Laricio.</i>	<i>Tsuga canadensis.</i>
„ <i>sylvestris.</i>	

ON THE TRUE MEANING OF "NATURAL SELECTION" AND THE "SURVIVAL OF THE FITTEST" IN NATURE.

By the Rev. Professor G. HENSLOW, M.A., V.M.H., &c.

[Lecture given on September 12, 1905.]

In a lecture delivered in 1908 on "Natural Selection *v.* Adaptation, or Darwinism and Evolution,"* I explained the use of the term "natural selection" as employed by Darwin in his theory on "The Origin of Species by Means of Natural Selection"—the title of his well-known book, published in 1859. I also pointed out that he tells us that he took the idea of natural selection from Malthus' "Essay on Population," but by inserting "structure" and "form," upon which species are solely based, he went beyond the application of natural selection by Malthus, since the latter was solely concerned with human beings.

Plants and animals do *not* die in consequence of slight variations of form. Darwin's theory, therefore, falls to the ground.

Natural selection, however, stands for a very real fact of nature; for, since the offspring of animals and plants are so numerous, it would be impossible for all to live, so that the vast majority perish in the young state as well as in the perpetual contests between them when adult. It is in this incessant struggle for life, whether in competing with other plants for the same ground, or in overcoming the difficulties of an inhospitable soil and climate, often without any neighbours at all, that natural selection is most in evidence. It must be remembered that it is only a *name for the result of the struggle*. The reason why some live and others die can be explained by the conditions of life alone.

The latest description of natural selection has been recently given by Professor G. H. Darwin, F.R.S., in his Presidential Address before the members of the British Association at Cape Town. He is reported to have said: "The fundamental idea in the theory of natural selection is the persistence of those types of life which are adapted to their surrounding conditions, and the elimination by extermination of ill-adapted types."

But, apart from abnormal monstrosities, nature has never been known to make "ill-adapted types."

When, however, two types are struggling together, say grass and colt's-foot, each may be equally well adapted to thrive if the other were absent. If a better adapted plant invade the territory of another, such as the colt's-foot among grass by a roadside, it may bring about the extermination of the grass by shutting off light and by starvation. Similarly, if seeds fall among grass or on sandy barren soil, they may fail to grow, even if they germinate at all.

Such I take to be the true and only kinds of the struggle for existence to which natural selection can be legitimately applied. There is no

* *Journal of the Royal Horticultural Society*, vol. xxviii., part i.

question of *origin*, but only of the *distribution* of existing species "by means of natural selection."

Professor Darwin goes on to say:—"The struggle for life amongst forms possessing a greater or less degree of adaptation to slowly varying conditions is held to explain the gradual transmutation of species."

But, in originating new varieties and species, the struggle for life is really not required at all. Indeed, new varieties arise much better without it, as every horticulturist knows and takes care that it should be so.

Nor need the conditions be assumed to be "slowly varying." New conditions are secured much more readily and actually by migration. The seeds of plants may reach very different surroundings by being transported by birds, wind, and water. They then respond to, and grow up in adaptation to, those conditions, or else, if they cannot do so, they must perish.

Professor Darwin's words imply that while some variations may arise with favourable adaptations, others may be ill-adapted.

This has been long shown to be erroneous. Experiments prove that *all* the seedlings of a plant *vary alike* and in direct response to the new conditions. This fact puts natural selection, as a means in the origin of species, out of court, for there are no different or "indefinite" variations from which may be selected the best fitted to survive.

Natural selection, in Darwin's sense, and *self-adaptation* are therefore *mutually exclusive*. Darwin, however, was not concerned with the origin of variations; but by *assuming* that they were indefinite, *i.e.* good, bad, and indifferent, then natural selection would "select" the best fitted to survive.

No instance of indefinite variation has ever been known to exist in nature; whereas all experimental evidence favours definite variation, *i.e.* in direct adaptation to the environment; when, as Darwin himself said, "a new subvariety would be produced without the aid of natural selection." * But natural selection in the true application of the term, as already stated, is universal; and it is my object to illustrate its action (speaking metaphorically, of course) in various ways.

In the first place, instead of using Darwin's expression, the "Survival of the Fittest" among different plants competing with one another, a more appropriate phrase would be "the best adapted under the circumstances."

Commencing with seeds, myriads never germinate at all, both of wild and cultivated plants. For example, in the midland counties, arable land has largely been converted to pasture, while the old method of surface drainage by "stiches" or "ridge and furrow" has been retained, *i.e.* the land is raised in parallel ridges with shallow troughs or furrows between them. On these ridges the bulbous buttercup, *Ranunculus bulbosus*, being a xerophytic plant, abounds; but it fails to appear in the furrows, which are about two feet wide. Now it would be absurd to maintain that the seeds could not reach the furrows. On the other hand, the field buttercup, *R. acris*, favours them, as they are moister than the ridges.

* *Animals and Plants under Domestication*, ii. 271; see Postscript.

The wild chamomile, *Matricaria Chamomilla*, is abundant on unoccupied ground in arable fields, farmyards, by haystacks, &c. And if the seeds have reached a bare place on roadside grass, whence a heap of stones has been removed, or where turf has been cut, the plants are sharply bounded within the oval line or oblong space by the surrounding grass. The seeds must have fallen alike among the grass, but they fail to grow there. This shows how seeds of this annual cannot stand against perennial grasses.

On the other hand, the latter succumb before perennials with creeping stems. Many a patch may be seen of the following plants whence the grass has vanished:—The creeping buttercup, *R. repens*; Dutch clover, *Trifolium repens*; stinging-nettle, *Urtica dioica*; colt's-foot, *Tussilago Farfara*; bracken, *Pteris aquilina*, and many others. Similarly on a cut lawn plantains and daisies may multiply till the grass has been utterly spoilt; but if it be left uncut for a few years, not a daisy or plantain would be found. Both grass and the other plants are equally fitted to thrive if the conditions be changed.

In gardens, as well as in nature, thousands of seeds are shed every year but fail to put in any appearance, as in a rhododendron bed, those of laburnums, and others which yield a profusion of seeds, comparatively few appear as seedlings. What becomes of the great majority of the seeds and why should a few only be "naturally selected"?

Hedges afford excellent examples of the struggle for existence and the survival of the best adapted under the circumstances. In Warwickshire the hedges are made of "quickset," *Crategus Oxyacantha*; but birds (probably) have dropped seeds of elder, privet, holly, &c., while sitting in them. By other means ash and maple "keys," nuts, acorns, sloes, hips, &c., have dropped into them. All these interlopers have thriven and the quickset has had to give way. To such an extent has this occurred that at the present time a hedge would in great part be deemed a privet hedge (and trimmed too), instead of being entirely of quickset, which only betrays itself at intervals. Perhaps the most effective and continuous supplanter is elm; for the numerous suckers from the roots of the elm trees standing in the hedge have in many instances converted it for long distances both ways into a perfect elm-hedge. Such are a few illustrations of the struggle for existence, which the observer can easily multiply.

There is, however, no "ill-adaptation" in the quickset hedge. It has long been recognised as one of the best adapted of woody plants for hedges; but it cannot stand against such broader-leaved ones as those mentioned; which soon obscure the light from it, so that the quickset is killed.

The same results follow from ivy on a tree; as soon as it reaches and spreads over the branches, from which it then hangs freely, the dense foliage obscures the light, and the tree in time perishes. Similar struggles for existence may be seen among aquatic plants.

Natural selection, therefore, is no "cause," nor has it any influence. The cause of survival resides in the one plant and conditions of life, as well as the cause of the extermination of the other.

I have remarked that natural selection stands for the distribution of plants. The following is a common illustration. A hedge, without any

ditch, is on one side of a well-trodden footpath; on the other is a strip of grass, say one foot in width, then comes the road sloping gently down to the latter, forming a little damp trough or gutter. Close under the hedge, where it is excessively dry, may be a long strip of *Hordeum murinum*, *Bromus sterilis*, or *Holcus lanatus*. All three are hairy, xerophytic grasses. On the other hand, the strip by the roadside, where it is damp, will be usually some such grass as rye-grass (*Lolium perenne*). In the little gutter itself may be plantains or silver-weed.

Hence, while the hedge and its companions are xerophytes, the *lolium* and the last mentioned are mesophytes.* Here again, the grains of the xerophytic and moisture-requiring grasses must reach each other's domains, being only the breadth of the footpath asunder, yet they keep true to their respective sides.

One may often see natural selection well illustrated in a garden, if it be at all neglected. I will give two of my own experiences. Having a bare piece of ground under some trees, I sowed it with "tennis-lawn" grass, and sprinkled sifted earth over it. The latter happened to have a good deal of chickweed seed in it, which came up with the grass and practically smothered it. Raking it off before the latter was injured, the grass grew well enough, but the locality proved to be too shady, and most of the grass ultimately died, the sole exception being cock's-foot (*Dactylis glomerata*), which grew in isolated tufts. The whole place was finally invaded by red campion (*Lychnis dioica*) from the adjoining shrubbery.

In another garden belonging to a house which was sold in the summer, the usual seed-crops had been sown in the spring, but were subsequently neglected. I wandered through it on the day of the sale and found all the crops of peas, &c., perishing in the struggle for life with chickweed, *Solanum nigrum*, *Urtica urens*, groundsel and *Poa annua*. These annuals had it all their own way, and the crops were ruined.

The last-mentioned grass is interesting. I made a lawn with turf cut from a hayfield in which was no *Poa annua* at all. A good deal of this grass grew in the garden as a weed in the borders and paths. It soon invaded the lawn, which was kept well mown. Gradually the perennial grasses disappeared till the lawn was almost entirely composed of *Poa annua*. It seeded profusely and became a perennial, the turf being perfectly good all through the winter.

Other illustrations of natural selection may be taken from the behaviour of certain British wildflowers accidentally or otherwise introduced into our Colonies. New Zealand has been especially studied in this respect. The following details are taken from Mr. Thomas Kirk's report on "The Displacement of Species in New Zealand."†

The author first supplies a list of species recorded as introduced, as follows:—In 1855, 44; 1867, 150; 1869, 251; 1872, 264; 1888, 885; 1896, 500.

On sea-beaches, native plants have been crowded out by *Bromus sterilis*, *Rumex obtusifolius*, *R. crispus*, *Erigeron canadense*, *Silene anglica*, *Holcus lanatus*, &c.

* I.e. intermediate between drought-plants or xerophytes and plants requiring moisture or hygrophytes.

† *Trans. New Zealand Institute*, vol. xxviii., 1896.

He particularly mentions *Phormium tenax* (the New Zealand flax), *Cyperus ustulatus*, *Pteris esculenta*, &c., as displaced by European grasses and clovers, as these sap away the nourishment and so starve them. Even shrubs five to eight feet high, as *Leptospermum*, are destroyed by grasses. This is also replaced by *Epacris purpurascens* from New South Wales, and by *Eucalyptus globulus* seedlings and wattles (*Acacia*) which out-top the shrub. *Robinia pseud-acacia* spreads and stops native growth by its numerous root-suckers. *Leptospermum* and *Pomaderris* are also killed by furze and broom, while *Rosa rubiginosa* (sweetbrier), *R. canina* (dog-rose), and *Rubus fruticosus* (blackberry) exclude light and air by their curved branches.

The rivers, too, have become impeded by *Salix babylonica*, *S. fragilis*, &c., while *Nasturtium amphibium* often grows many feet in length, with a stem nearly an inch in diameter, and even rises 8 to 5 feet out of water, thus, with *Anacharis* (*Elodea*), choking the rivers. The waste lands by new roads in New Zealand are also infested by English weeds, as docks, thistles, *Juncus bufonius*, &c.

As an experimental result of the struggle for existence with an inhospitable soil, an experience of Messrs. Livingston and Jensen is instructive.* They grew a number of wild plants in tubs full of sand, in three degrees of fineness; the particles of the finest grade had an average diameter of 0.02 mm.; those of the medium grade 0.6 mm.; and those of the coarse 1.15 mm.

The result is shown in three photographic representations.

In the first the tub has a collection of vigorously growing plants. In the second they are much inferior in size, while the plants are reduced in number. In the third such is still more the case.†

The heights of some of the plants were in centimetres as follows:—*Potentilla anserina* in finest, medium, and coarse sand, respectively, 20–28, 8–10, 6–8; *Verbena hastata*, 14–19, 5–8, 2–8; *Poa pratensis*, 15–20, dead, dead; *Poa compressa*, 28–40, nearly dead, dead.

Oxalis cernua furnishes an instance of extraordinary diffusion. It has an umbel of drooping golden-yellow flowers. It is a weed about Cape Town, and fruits there. In 1804, a few of the tiny bulbs by which it is also propagated were sent to Father Hyacintho, the Professor of Botany, Valetta, Malta. During the hundred years which have elapsed since that date, it has spread all over that island as well as Gozo. By the exportation of oranges, &c., it reached Egypt about 1820, Gibraltar in 1829, and various other places along the coasts of the Mediterranean Sea, so that it is now to be found at different places from Egypt to Morocco and from Gibraltar to the Greek Islands, as well as in the Canary Islands. In Malta it is most prolific; fields often look as yellow as an English meadow with buttercups. It finds a home everywhere, even on the tops of high walls of the fortifications, and it clothes the roadsides instead of grass, having expelled the native verdure. For a century it has thus proved itself to be perfectly adapted to thrive in

* "An Experiment on the Relation of Soil Physics to Plant-growth," *Bot. Gaz.* vol. xxxviii., p. 67.

† All the plants in the three tubs were supplied with salts essential for growth, viz. KH_2PO_4 , $\text{Ca}(\text{NO}_3)_2$, MgSO_4 , NaNO_3 , CaCl_2 .

the warmer temperate zone of the northern hemisphere. It is a trimorphic plant, but only one form, the "short-styled," is known in the north. It never sets seed, though it might be thought capable of doing so by the pollen falling upon the stigmas; but it is solely propagated by bulbs. Indeed, Italian botanists record that the fruit has never been seen; the whole of the flower articulates, leaving the pedicel.

As a tropical example of natural selection, an equatorial rain-forest might be taken, in which a constantly uniform condition of moisture and heat stimulated growth, every square foot being pretty well occupied by some kind of vegetation. Consequently an intense struggle for existence has obtained, till something like equilibrium has been established. The trees are tall, more or less unbranched till the stems have attained a great height, when the struggle for light goes on.

Other plants have acquired the habit of climbing, which enables them to reach the light as well.

Another group with very light seeds, as orchids and rhododendrons, or spores, as of ferns, and easily diffusible by the wind, have located themselves on the trunks and branches of trees, and so secured a home, which they could not have done on the ground in competition with more powerful plants. They exist and thrive by having acquired xerophytic structures.

In dry tropical and subtropical regions, the character of the vegetation is quite different; and though many may grow together, spinescence and succulency have become characteristic features.

With these plants the struggle for existence is, perhaps, more generally with inhospitable conditions of soil and climate. These are great aridity, a sandy and rocky ground.

In such surroundings, like the epiphytes in a rain-forest, the plants exist by adapting themselves to these by becoming xerophytes, the chief adaptation being the acquisition of great succulency, by means of which water is stored up against the dry season, which lasts during the greater part of the year.

In many instances where the soil is sandy for great depths, plants have developed long roots by means of which they can reach subterranean water. In the case of the Narras plant of Damaraland, a member of the *Cucurbitaceae*, the roots sometimes attain a length of forty feet.

Very similar conditions prevail in high Alpine and Arctic conditions, as far as their effect upon plants is concerned. The struggle for existence is more often with the physical conditions than in competition with other plants; and those which characterise such inhospitable regions have secured their positions through adaptations, by responding to them.

Numerous experiments have proved this interpretation to be true. Plants of lowlands or of lower latitudes have been grown on the Alps and Pyrenees or in high Arctic latitudes, and *vice versa*; and they have always acquired in varying degrees all the characters and habits of plants native to those regions respectively.

In Arctic regions the struggle for existence against the inhospitable conditions of existence is very intense. The causes of the dwarf habit due to arrested growth are the low temperature in summer, and the cold soil;

these have the same effect as drought. Coupled with this is the continuous illumination, which tends to arrest the stem-growth.

A juniper stem was found to be $3\frac{1}{4}$ inches thick with 544 annual rings (counted under the microscope): an annual ring consisting of *one vessel* and *one cell of wood-parenchyma* in a radial direction. This was in a sub-Arctic zone. The roots, as is the case in dry soils, attain considerable size, to search for a sufficient supply of water; while nitrifying bacteria are greatly reduced in quantity in consequence of the soil temperature being low.

The most northern of all latitudes where plants can grow at all are the Arctic Tundras, where all flowering plants cease to exist, and nothing but mosses and lichens can flourish as the result of natural selection.

Enough has now been said to show that "natural selection" stands for a phenomenon of plant life which may be witnessed everywhere. It means *the Survival of the Best-adapted under the Circumstances, in the Struggle for Life*, either in competition with other plants, or with a more or less inhospitable environment.

In all cases the explanation of the survival of the best adapted is because such happen to be more suitable to enable them to maintain the struggle.

Lastly, such adaptations have always arisen through the *Responsive Power of Protoplasm and the Nucleus*. These together construct cells, of which tissues are made, out of which organs are built up which are best in harmony with the external conditions of life.

Natural selection, therefore, has nothing to do with the *origin* of species; this supposed function is really solely and completely secured by self-adaptation to the conditions of life; but it has much to do with the *distribution* of species all over the world.

Postscript.—Since the above lecture was in type, Mr. Druery has called my attention to his experience with ferns, and observes: "Given a pan of variable seedling plants, such variations as involve smaller size and smaller area of foliage surface are injurious, detrimental, and destructive, when they occur associated with other variations in the same species, but of opposite kind; the result being that the robust variants overgrow and eventually starve out the smaller by depriving them of root-room and light."

The reader will perceive that this is only another instance of natural selection, as above explained, applied to seedlings. "Size," *per se*, is not injurious; for where can the line be drawn? Had still more robust plants been present in the pan, then those alluded to as survivors would have perished in their turn.

What I take Darwin to have meant, was some variation *injurious to the plant itself*, irrespective of others; comparable, *e.g.*, to a child unhealthy from its birth, or other of Malthus' causes of death in human beings. It was a purely imaginary hypothesis to suggest such "injurious variations" of structure.

THE IDEAL POTATO.

By WALTER P. WRIGHT, Hon. Secretary of the National Potato Society.

[Lecture given on October 24, 1905.]

THE ideal potato has not been found. It must be: (1) a heavy cropper; (2) a good cooker; (3) a disease-resister; (4) a large tuber.

Nature has not given us the combination we require, and the cross-fertiliser apparently finds it difficult to overcome her reluctance to do so.

In modern times the famous 'Up-to-Date' has come as near as any variety to the standard. It did not, however, cook very well in its early years, and now that it has remedied that defect it is becoming yearly more a victim to blight. The hybridist's difficulties are enhanced by the fact that cultivators are not agreed on one very important point: namely, whether heavy cropping or flavour is the more desirable property. The market grower cries out for bulk of crop, the private cultivator for table quality. This divergence of view is explained by the simple fact that the one grows for other people to eat, and the other for his own palate. Since we cannot find in one potato the combination of qualities we require, it behoves us to make a selection from among those varieties which possess one or other of the requirements in the most marked degree. Let us take flavour first.

The six best cooking potatoes that I know are:

Factor	Langworthy	Up-to-Date
Golden Wonder	Peacemaker	Windsor Castle

'Factor' is a splendid variety of the 'Up-to-Date' class, a large, handsome tuber, and a heavy cropper. 'Golden Wonder,' 'Langworthy,' and 'Peacemaker' are all of the 'Maincrop' type. They are neither large tubers nor heavy yielders. 'Up-to-Date' and 'Windsor Castle' are too well known to need description. Both are past their best as disease-resisters.

Our next point may be disease-resisting powers. I regret to say that I know of only two potatoes which show almost complete immunity from blight. They are Findlay's 'Evergood' and Sutton's 'Discovery.' 'Evergood' is a handsome tuber and crops well, but is defective in flavour on many soils. 'Discovery' cooks well, but is a light cropper. As a matter of fact, the superabundant vitality which makes it keep on growing late, in spite of all the assaults of disease, militates against heavy bearing. Many varieties which are described as disease-resisters are only so in comparison with certain very blighty sorts. They do not succumb to slight attacks, but a severe trial finds them wanting.

It may be well to name a few selected varieties for special purposes or qualities.

Early varieties :

Duke of York	Ninetyfold
May Queen	Sharpe's Express

'Midlothian Early' to be tried as a promising novelty.

Later varieties :

British Queen	Royal Kidney
Nobleman	Sir John Llewelyn

Late varieties :

Dalmeny Beauty	Highlander	Sensation
Duchess of Cornwall	Scottish Triumph	Warrior
Factor		

All of these are heavy croppers of the 'Up-to-Date' type.

Good heavy-land varieties :

Evergood	Factor	Northern Star
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Good light-land varieties :

Factor	Royal Kidney
King Edward VII.	Sir John Llewelyn

There is a fact which is in danger of being overlooked from its very simplicity: namely, that culture has far-reaching influences alike on cropping, flavour, and immunity from disease. We have got into a way of discussing the peculiarities of varieties as though they were fixed quantities, incapable of modification by external influences. We can so maltreat our seed that the heaviest cropper becomes a weakling. We can so over-manure that the best flavoured sort becomes coarse.

Let us glance at a few salient points in potato cultivation. Is there any parallel amongst cultivated crops for the scandalous mismanagement to which potato seed is subjected? Too frequently, when the crop is lifted, all the tubers alike go into the pit, there to remain in warmth and darkness for several months. They make long, blanched, attenuated shoots, which are broken off by the bushel when the tubers are dressed for planting. Is a thought ever given to the fact that this means so much vitality lost to the seed? In recent years boxing has been re-discovered. The practice is so old that no man of the present generation can claim to be its inventor. But even at the present day it is the exception for growers to box potato seed. One small inexpensive trial reveals its merits. The seed that is selected in autumn, greened through exposure to light, and boxed in late winter, has all its inherent vigour unimpaired.

Knowledge of the varying vitality of mature and immature seed is still in its infancy. About seven years ago, when the dread scourge "curl" made its reappearance (for it is an old enemy that has long lain practically dormant), southern stocks suddenly lost all their vitality, &c. In the main they have never regained it. Suffering cultivators declared that it was the series of hot, dry summers, prematurely ripening the crops, which caused the trouble; but it did not occur to them all at once to try the experiment of lifting some of the plants while still green, and seeing

whether the tubers taken thus unripe were vigorous or not. In the autumn of 1904 I paid a visit to the Fifeshire potato farms of Mr. A. Findlay, and in walking through his stores my attention was arrested by the rubbed skins of his stocks. The great raiser at once cheerfully admitted being an advocate of unripe seed. His belief in it was and is profound. Potatoes are generally planted later in Scotland than in England; the cool, humid climate keeps them growing longer; and thus it is that they are frequently green when frost comes and blackens them as it does our dahlias. The acknowledged superiority of Scottish seed may not be wholly due to its comparative unripeness, but I am convinced that immaturity is partly the cause.

Why, too, should any refuse to be thought large enough for seed? A large tuber planted whole with eyes (or subsequent shoots) unthinned may not always crop well, because frequently overcrowding follows; but a large tuber of which the eyes or growing shoots are reduced, so that no overcrowding is possible, and of which all the energies are concentrated on a few shoots, is invariably productive.

It may be asked: What is the choice as between small tubers with several small eyes, and a portion of a large tuber with one or two large eyes? My experience teaches me that the latter is the better if the seed is properly treated, and is seared with lime to prevent loss of sap and to keep off insect attacks. But "ware" tubers that have been devitalised in a clamp are in a different class. It is only right to add that certain varieties do not bear cutting very well in any case, but they are few. I have cut a great many sorts during the last few years, and I can only think of two which have actively resented it: they are 'Conquest' and 'Sir John Llewelyn.' Round varieties generally bear cutting better than kidney. In any case of doubt it should be remembered that well-prepared, sprouted whole seed, of about two ounces in weight, is a good standard.

Single-eye propagation is obscured under a heavy cloud as a result of the disastrous effects which have resulted from it during the past year or two. I see no particular reason for trying to resuscitate it; at the same time, the failure of speculators who have rushed into potato propagation without the slightest experience does not prove that skilled horticultural propagators do not know perfectly well how to raise large stocks of healthy potatoes from single eyes.

My next cultural point is *manuring*. The chief thing to recognise is that for early crops "yard manure" should preponderate, and for late ones "chemical." Yet this is overlooked. For all seasons I believe in a blend of both. In this potash-mad age it sounds heretical to question the efficacy of kainit, yet unsupported by superphosphate it has given me poor results. To have any material value it must be used in autumn or early winter. My ideal dressing is yard manure under the top spit at the rate of two barrowloads per square rod, and a mixture of superphosphate, steamed bone flour and sulphate of potash, in the proportion of 4 lb., 1 lb., and 2 lb. per square rod. The yard manure is laid in in autumn or early winter, the "chemicals" in late winter. If the furrows are made and the fertiliser laid in some weeks in advance of planting, the soil becomes well sweetened and fertilised.

It has been said that chemical manures affect the flavour of potatoes injuriously, and this may be so if the land becomes acid through the repeated applications of "super"; the slight addition of steamed bone flour corrects any such acidity.

A dressing of lime for over-manured land is a common practice, but the dusting of lime over stored seed potatoes is not. It is inexpensive, easily applied, and a safeguard against the spread of disease.

The troubles of potato-growers are many, for although the too familiar *Phytophthora* has not left us, "curl" and "black scab" have come. It will be sufficient to say of the old disease that except in very wet years, such as 1908, the now well-known "Bordeaux mixture" answers its purpose.

I have already spoken of "curl" (*Macrosporium solani*). This has worked terrible havoc in recent years. The remedy is cultural. Change of seed is the most important step. Bordeaux mixture, applied in the early stages of growth, is recommended, and may have answered in some cases, but it has certainly failed in others.

"Black Scab" (*Edomyces leproides*) is a hideous malady. The attack is sometimes developed at an early stage of growth, beginning at the eyes and covering the tuber gradually with dark and evil-looking contortions. In other instances the potatoes attain to full ware size, and are then attacked at the eyes. Dusting with flowers of sulphur is the best remedy, and is also recommended for "Winter Rot" (*Nectria solani*). In all cases of fungoid diseases the burning of affected examples is advised.

The fact that potatoes are assailed by so many formidable enemies, and are in addition indubitably subject to a natural process of degeneration, lends importance to the production of new varieties. In this connection grave abuses exist. Old sorts are put on the market under new names in the most unblushing way, and until the establishment of the Synonyms Committee of the National Potato Society no organised expert effort had been made to check these malpractices, which are so injurious to the trade.

There is a wide field open for potato improvement. Varieties last only a few years, and need replacing by more virile sorts. These in their early days are frequently open to criticism on account of the production of superabundant root-fibres, supertuberation, and want of flavour. Experience with 'Up-to-Date' has taught me that if a potato is productive, shapely, and vigorous, it must not be too hastily condemned. That sterling sort was greatly addicted to second growth, and was of moderate quality, when it was first put on the market. It was a coarse field variety, and nothing more. But it mellowed down into a valuable garden sort, "supertuber" but slightly, and cooking well. For this reason I am disposed to suspend judgment over 'Northern Star,' in spite of its present defects.

Potato-raisers must not be afraid of vigour. "Deep-eyed" varieties must, of course, be eschewed, but a good deal of fibre at the root, and a modicum of second growth, are not necessarily fatal. Vigour is absolutely essential, and it has to be remembered that, with the natural loss that ensues, a potato which has not too much at first soon has too little.

While I have found the raising of potatoes from seed out of the

"apple" interesting work, it is necessary to warn would-be raisers that a great deal of patience is necessary. Many good potatoes, 'Royal Kidney' for example, produce no flowers at all, or only a few casual ones. 'Ever-good' also flowers very sparingly. Others which bloom do not produce pollen. 'Up-to-Date' is one of the latter, hence it cannot be used as a male parent. The statement that it will not set "apples" if cross-fertilised with pollen from another variety is, however, inaccurate. It has been crossed by several raisers, and apples secured. A notable example of success in securing progeny from 'Up-to-Date' is Sutton's 'Superlative,' of which 'Up-to-Date' is the mother. Again, I have been informed that 'Factor' is a cross between 'Abundance' as the male and 'Up-to-Date' as the female parent. This cross was a lucky one for the raiser, as 'Abundance' produces very little pollen, and often none at all can be got.

It is noteworthy that the products of cross-fertilisation generally differ widely from the parents. Who would have foreseen in 'Flourball' or 'Reliance' parents of so marvellously robust a potato as 'Discovery'? The fact is the cross-fertilisation of potatoes is full of uncertainty, and thousands of seedlings frequently yield nothing. A seedling may attain to extraordinary dimensions, and yield a huge crop in its first year. I have known a plant from a seed sown in February bear nearly a stone of tubers in September of the same year.

It may be noted that a seedling will often be very badly diseased in its first year. Another may be free for three years or more, and then show weakness. Again, a poor first-year and a good first-year seedling may reverse their order of merit with age. Five years' trial is none too much for a seedling, and it is earnestly to be hoped that raisers will select and re-select with care, so that as far as possible the character of a novelty may be well fixed before it is put out.

There is no difficulty in pollination, but the pollen must be carefully watched for, so that its right period may be caught. The "apples" may be preserved through the winter in drawers, or suspended in a cool room. My method of sowing is to take a cutting-box in February, nearly fill it with leaf-mould and sand, place the seeds in one by one as if they were tomatoes, and put it on a shelf in a greenhouse or in a frame. They germinate quickly. If given plenty of room they may be left in the seed-box till mid-April, and then be planted out; this saves trouble. But stronger plants are got by pricking off from the seed-box into others, and letting the young plants grow on into sturdy specimens before putting them out.

CHEMISTRY IN RELATION TO HORTICULTURE.

By Dr. J. A. VOELCKER, M.A., F.I.C.

[Lecture given on November 7, 1905.]

THAT the teachings of chemical science have an important bearing upon the practice of agriculture is universally recognised, and, seeing that horticulture may be considered as a specialisation of agriculture, it is not unreasonable to conclude that a knowledge of chemistry may be made to usefully serve the ends of that industry also. At the same time, there are such wide differences between the conditions under which the two arts are practised, that one is disposed to overlook somewhat the aids which chemistry may give to horticulture. It will be my aim in this paper to set out some of the main ways in which a better understanding of the chemical principles involved in sound practice may come to be of benefit to the horticulturist as well as the agriculturist.

That such benefit may be derived is recognised, I feel, by the Council of the Royal Horticultural Society, in the appointment which I have the honour to hold—that of consulting chemist to the Society—and, inasmuch as this is the first occasion on which I have addressed you, it may be well that I should deal with the work of my department in a quite general way rather than by selecting any one particular aspect of it and dealing with that in detail. Inasmuch also as the Council of the Society have afforded the members special privileges in respect of chemical analysis, consultation, and the like, I may take this opportunity of showing in what ways these may be exercised to advantage, and also, from the experience gained in the carrying out of such work as has been entrusted to me in the past few years, I may derive some lessons that are capable of further useful application.

I have said that in the wider field of agriculture no one would now doubt the advantage, nay, the necessity, of taking into consideration and utilising the lessons of chemistry. Whether it be the application of some new principle, or the utilisation of some new material, there are points involved in which chemistry will take an active share, and the more it is understood the greater will the benefit be. And yet, alike in horticulture as in agriculture, the main function of chemical science will be to explain, regulate, and extend sound practice, rather than to make any novel or startling discovery. So here, it will be for me to speak of chemical science as providing the explanation of observed facts, and not as in any way aiming at revolutionising practice.

Though the same principles of plant growth and nutrition underlie both agriculture and horticulture, there are marked differences between the two arts which make the application of these principles dissimilar in the two cases, and cause their importance to be relatively less when horticulture is concerned. In the first place, agriculture may be termed a necessity, while horticulture is a recreation; the one is carried on as a

business, the other largely for pleasure; agriculture is pursued for profit, horticulture is almost regardless of such considerations; agriculture is carried out on a large scale, horticulture on a relatively small one. Again, the persons interested in the two industries differ—for, while farming, with but few exceptions, is largely the work of those who possess but limited means, and who have to make it “pay its way,” horticulture, on the other hand, is pursued under conditions happily free from such limitations. Nor are the aims alike, for while horticulture is mainly concerned with the production of flower and foliage, agriculture has chiefly to do with the finished product, the seed or grain, the straw or hay, the bulb or root, and the utilisation of the same as the food of man or beast. So also does the appearance of the area occupied differ, for, while in agriculture a rotation in cropping is largely followed, in horticulture the same land is being continually devoted to the same plant. Such considerations as these must largely affect the application of the general principles I shall have to deal with, and limit their significance when horticulture is specially concerned.

With these general remarks I shall proceed to take up in succession the consideration of the main factors that have to do with plant life, in their application to horticulture especially.

THE ATMOSPHERE.

In horticulture, as in agriculture, we are concerned in the first place with the essential constituents of the atmosphere—the oxygen, nitrogen, and carbonic acid, the latter playing the chief part, and providing, along with water, the main portion of the plant's structure. Plants derive the whole, or nearly the whole, of their carbon from the atmosphere, the carbonic acid of which is taken in by the leaves, and, entering the cells, is, in the presence of sunlight, and probably through the agency of the chlorophyll corpuscles, decomposed, transferring its carbon to the plant, where it is variously elaborated, the products being conveyed to the different parts of the plant, and going to build up the several tissues and cell-contents. It is in this way that the woody fibre of plants is formed, this being in effect the thickened cell-wall. The large class of carbohydrates, comprising mainly the starches and sugars, are derived from this source too, as also the gummy matters, the fats, and the vegetable acids. With the aid of nitrogen, the carbonic acid goes further to build up the amides and alkaloids, and, with nitrogen and sulphur, the albuminoids. As examples of the above may be mentioned the starch of the potato, the sugar of the beetroot, mangold, and turnip, the mucilage of linseed, the fat of oil-seeds, the malic acid of apples or citric acid of lemons, the amides found in asparagus or other immature nitrogenous vegetables, the alkaloids of the tobacco plant and poppy, and lastly, the albuminoids of peas, beans, and other leguminous plants.

When this decomposition of carbonic acid goes on and carbon is deposited in the plant, the other constituent of the carbonic acid, viz. oxygen, is given out to the air, providing in return the means of sustaining animal life, and keeping up thus the balance between plant and animal requirements whereby each shall thrive. It is only, however, in

presence of sunlight that this decomposition takes place, for in the dark, or under the influence of a low temperature, the opposite process goes on, the cell-contents undergoing oxidation to some extent and carbonic acid being expired. This action, however, proceeds to a much less degree than does that of carbon assimilation and the giving out of oxygen. It is shown in the sprouting of the potato when kept in the dark, no green parts being formed, and the starch of the potato undergoing oxidation; also in the case of parasitic plants like dodder and broom-rape, and with all the fungi, plants which possess no green parts, *i.e.* which have no chlorophyll. The former live upon juices of other plants on which they thrive, while the fungi derive their nourishment from decaying organic matter.

The presence of oxygen in the atmosphere plays an important part, further, in the germination of seeds. The seed contains the embryo, and this is rich in albuminoids, fats, and mineral bodies (chiefly potash and phosphoric acid). Under the influence of suitable moisture and temperature the oxygen of the air penetrating into the soil reaches the seed and oxidises the contents of the embryo, rendering them soluble, probably by the agency of ferments present and known as "enzymes," when, as the result of the oxidation, carbonic acid is given off. Hence atmospheric oxygen is a necessity for germination to proceed properly. This is well seen in the fact that seed, if buried too deeply in the soil, will not germinate; for, if placed beyond the depth to which the oxygen will penetrate, the changes just described, and which result in the formation of root and plumule, cannot proceed.

In addition to taking in carbonic acid as described, plants have a limited power of taking up ammonia through their leaves. Ammonia is always present in small quantity in the air, but not nearly in quantity sufficient to provide the plant's requirements of nitrogen. Nor is there any evidence that plants have the power of taking up by their leaves or other green parts the nitrogen of the atmosphere. Indeed, the exact contrary has been proved by the classic work of Lawes, Gilbert, and Pugh. Far, however, from the nitrogen of the atmosphere being a useless ingredient in plant-life, recent investigations, commencing with the discoveries of Hellriegel, have gone to open up a most interesting field of inquiry, and to show that certain classes of leguminous plants have, under favourable conditions, the power of utilising the nitrogen of the atmosphere, not by their leaves, but by their roots.

On the roots of leguminous plants of the order Papilionaceæ have been observed swellings, or "nodules" as they are called, and examination of these has shown them to be of bacterial origin and to contain organisms which have the power of assimilating the atmospheric nitrogen distributed throughout the soil, and of building it up to form the nitrogenous constituents of these plants. It was found by Hellriegel that when these nodules were present the plant thrived and contained nitrogen far in excess of anything capable of being accounted for by the nitrogen in the seed, the soil, the water, or the ammonia of the atmosphere, while in the absence of nodules the nitrogen and consequent growth were bounded by the amounts supplied from these other sources. Also that when nitrogen was withheld only a stunted growth was obtained and no nodules were

formed. Hence the conclusion—since abundantly confirmed—was come to that these plants were able, through the agency of the organisms contained in the nodules on their roots, to take up and assimilate atmospheric nitrogen. In this way has been explained what was for a long time a mystery, viz. that clovers, peas, beans, while themselves essentially nitrogenous in composition, were able to dispense with special nitrogenous manuring and at the same time left the soil on which they had been growing richer in nitrogen than before. It would seem possible, too, that there are certain low forms of organism in the soil which possess this same power, but with this exception the capability would appear to be restricted to the Papilionaceæ. Arising from these discoveries, attention has been more recently directed to means of inoculating the seed before sowing with materials that may ensure the production of nodules on the roots and the consequent utilisation of the atmospheric nitrogen.

Besides oxygen, nitrogen, carbonic acid, and a small quantity of ammonia, the atmosphere will contain varying amounts of other constituents, such as nitrates, nitrites, chlorides, and sulphates, the quantity of which will differ according to local circumstances. Thus, in proximity to the sea there will be found much more salt (sodium chloride) than elsewhere, and the presence of factories in the neighbourhood will cause increase in the sulphur compounds present. Plants of maritime origin, like the cabbage and the mangel, will be favoured by the presence of an atmosphere carrying salt with it, while the same fact accounts for the profitable employment on them of salt as a manure.

While the useful character of the constituents of the atmosphere has been spoken of, it must be borne in mind that the atmosphere, by reason of the pollution it may undergo at the hands of man, may become the carrier also of ingredients harmful to, or destructive of, plant-life. Of such nature are the emanations from factories and the smoke of densely populated towns. Much has been said against London smoke, but it is probable that the harm done to vegetation is mainly due to the mechanical blocking up of the breathing surfaces of the leaves by the solid particles carried in the air rather than to the emission of any directly poisonous gases, and, despite all, it is astonishing how well trees and plants do grow even amid the untoward surroundings. The subjection of trees and plants to the emanation of gases coming from the chimneys of alkali works, smelting and blast furnaces, and the like, is, however, of a very different nature, and where such exist there is not merely the discomfort from the presence of solid black particles carried over, but there is the positive blighting effect of gases such as sulphurous acid and hydrochloric acid, and the injury done by arsenical fumes and emanations containing copper, lead, zinc, and other harmful metals. To these vegetation shows itself most susceptible, and the devastation caused to trees, hedges, and plant-life generally in a district where factories abound cannot fail to be recognised. Trees are variably sensitive to such influences, conifers in particular being most readily attacked.

The extent of such damage will depend much upon the surroundings, the force and direction of the prevailing wind, the extent of saturation of the atmosphere, and, of course, the intensity and continuity of the emanations. A sudden emission of a heavily laden blast will do harm

that much larger quantities will not do if spread over longer periods. When the atmosphere is heavy and moisture-laden the fumes will be less able to disperse, and then it is that most harm is done. Injury may be caused not only to trees and shrubs, but also to grass and thereby to stock feeding on it. I have known cases in which, from the smelting of copper ores, comparatively large quantities of copper and of arsenic, together with sulphurous acid, were carried for a distance of two to three miles and seriously affected the herbage and the health of stock, besides killing all trees and hedges in the direct course of the fumes. Similarly brickworks, where the clay used contains a good deal of pyrites, may emit a quantity of sulphurous acid and do injury alike to foliage, grass, and stock.

Ammonia gas, again, is very fatal to plant-life, and, to come to matters of more daily concern to the gardener, I have known of cases where irretrievable harm has been caused to plants through the coating of greenhouses internally with tar that has contained a considerable quantity of carbolic acid and other volatile products. The heat has caused these to be given off and the plants have rapidly suffered. When this is the case the trouble is one most difficult to get rid of; limewashing will avail somewhat, but time is needed until all exhalations that will come off have done so. In one case brought to my notice, the gutters inside a melon-house had been coated with a mixture of tar and paraffin, paint being subsequently put on. The plants died and at the same time it was noticed that "fumes" (as they were described) were given off from the tar. I have no doubt that the injury arose from the presence of volatile matters in the tar used.

The difficulty with the detection of the cause of injury in all these cases is to find on the injured plant or tree clear evidence of the presence of the suspected ingredient. It is only indeed in the case of certain heavy metals like copper, arsenic, &c., that the materials themselves can be found; in many others the harm has been done and no trace of the harmful material is left. So, too, a plant may be killed by the use of carbolic acid, bisulphide of carbon, or other volatile substance which will do the injury but then volatilise and not be capable of detection.

MOISTURE.

Next to the atmosphere comes, as an important factor in plant-life, moisture. While soil is of great importance, moisture is perhaps more so, as there is no soil that is absolutely devoid of nutriment, while without moisture nothing whatever can be done. In most cultivated plants, garden and farm crops, 90 per cent. of the total substance is water, and even timber contains 40 per cent. A small amount may be taken in directly by the leaves, but by far the greater part is obtained from the soil and is utilised there in combination with dissolved gases for the purpose of rendering the constituents, both from soil and manure, soluble. The water is absorbed by the plant through its roots, and is transpired through the leaves and other parts of the plant, thus causing the sap to rise and drawing up the dissolved plant-food for distribution through the entire structure. Hence the presence of moisture is of the greatest

importance alike for supplying the bulk and the nourishment of vegetable life. To the horticulturist this does not present the same difficulties as it does to the farmer; for, while the latter is dependent on the natural and varying rainfall, the gardener can practically control the supply in any way he may like. This may not apply so fully in the case of what is grown in the open as, *e.g.*, in a vegetable garden, but at all events the gardener is much better off in this respect than the farmer. Different plants have their several requirements, each of which should be studied, and the giving or withholding of moisture be exercised accordingly. So too is it with heat, this again being, to a considerable extent, within the power of the gardener, whereas the farmer is dependent entirely on natural sun and warmth, and subject to cold and wind, frost and snow.

Altogether, then, the gardener's position is a much more artificial one; he is able to make more use of external aids, and so the serious considerations affecting the agriculturist in the matter of dew, rainfall, drainage, &c., have not so much significance for the horticulturist. Still, there are points of similar application to both, for, in the preparation and cultivation of land, be it for farm or for garden, efficient drainage in the case of the heavier soils, and sufficient retentive power for moisture in lighter ones are absolute necessities.

Want of proper drainage will cause stagnation to ensue and bring about a coldness of the soil which will hinder the process of oxidation and the other agencies at work in the soil, whereas land properly drained will be warm and porous, ready for the easy penetration of the root and root-fibres, and possessed of the conditions requisite for the entrance of oxygen and for the free exercise of the processes resulting in the supply of plant-food. On the other hand, land devoid of matter capable of holding moisture in sufficiency will tend to "burn." The retention of water is very different in different soils, and depends upon the fineness of division of the particles; a gravel or sand retains the least moisture, a loam more than a clay, and a humus or peaty soil the most. Similarly the gravel or sandy soil loses its moisture most readily, and a clay soil less so; while, in order to prevent rapid evaporation from the surface, a thorough cultivation of the soil, to obtain it in a fine and loose condition, is most desirable.

Closely associated with the question of the supply of moisture is the consideration of the different kinds of water used by the horticulturist. It is to be feared that often one water is regarded like another, and though there may be a general impression that one kind is softer or harder than another, little is done, as a rule, to ascertain what the differences are, or whether there may be that in the usual supply which may make it injurious to or unsuitable for plants. Taking the number of samples that have been submitted to me by members of the Society for analysis, it is true that the larger proportion of these have been of waters. But in the great majority of cases the application has been made in respect of their use as drinking waters, and not primarily for horticultural purposes. Still, there are instances in which useful information has been obtained, and where explanation of difficulties that have arisen has been found. It is generally, and very rightly, believed that rainwater is, all round, the best for horticultural purposes, but the

quantity of it is unfortunately limited, and recourse has to be had to ponds, streams, springs, or public water supplies, often of very varying character.

A hard water is, generally speaking, one rendered so by the presence of salts of lime and magnesia, and is of two kinds: "temporary" hardness, where the lime is present as carbonate of lime, and which water can be rendered soft by boiling; and "permanent" hardness, where the lime and magnesia are present largely as sulphates, and which cannot be deprived of its hardness by boiling.

Hard waters, of whichever type, are known to be very bad for such plants as do not thrive on a soil rich in lime; among these are the heaths azaleas, rhododendrons, &c., and hard water should on no account be used for them. Hard water is also bad for foliage plants and ferns.

Other waters may contain a large quantity of dissolved salts, such as common salt, sulphates of soda and magnesia, nitrates and the like. Some of these may, indeed, be quite saline or brackish, and may, as a class, be set aside as undesirable, though, if the salinity be due to nitrates, it may be beneficial rather than otherwise, and equivalent to a manuring with nitrate of soda or potash. When a water is of "temporary hardness" character, this is due mostly to its being derived from chalk or limestone, and it is possible by treating this in one tank with milk of lime, and allowing the clear water, after settling out of the lime, to pass into another tank, to have for horticultural use a regular supply of softened water. To obtain a satisfactory result, however, it is necessary to adjust the quantity of added lime to the proportion of lime in the original water, and for this purpose the aid of the chemist should be sought. With other waters containing excessive dissolved matters nothing practicable can be done, and the best thing, if a better supply be not available, is to dilute them as far as possible with rainwater. In a case recently referred to me, the gardener of one of our largest landowners sent me up samples of the waters used in the gardens, and complained that one of them which was being used chiefly for plants had a serious effect upon them. On analysis I found the waters to give the following results:—

	I.	II.
	Grains per gallon.	Grains per gallon.
Total solid residue	184.52	17.58
Chlorine	74.90	1.20
Equal to chloride of sodium .	125.34	1.98

No. I was the water complained of; the residue consisted mainly of chloride of sodium (common salt) and chloride of magnesium, together with a certain amount of lime salts, and the water had a distinctly saline taste. A water with so much saline matter in it is one quite unsuited for horticultural use, and I have no doubt that the injury to the plants was caused by its use. No. II. on the other hand, was a water that could quite well be used. It may be of interest in this connection to say that the Royal Horticultural Society, on acquiring their new grounds at Wisley, had the water supplies there analysed, and with satisfactory results, the water from the Upper Well showing only 11.48 grains per gallon of total solid residue, and that from the Lower Well 28.56 grains per gallon, the former thus being the more generally suitable for garden uses.

PLANT FOOD.

We come next to the consideration of those ingredients which are supplied to the plant through the medium of the soil. These are, mainly, the mineral ingredients. They form, as we have seen, a relatively small proportion of the bulk of plants, and yet their importance is of the highest, both to agriculturist and horticulturist. We have spoken of the atmosphere as supplying the carbonic acid out of which the plant's structure is mainly built, but this supply is one that never fails, whereas the soil may be very variable in the amount of mineral food it contains. Without the supply of each essential mineral ingredient, and this in sufficiency according to the requirements of the individual plant, there can be no proper growth, and so it comes about that soils frequently require supplementing in respect of one or another of their mineral constituents. These, together with nearly all the nitrogen and water required by plants, are obtained by the roots, which take them up in a soluble state, and also (by virtue, it is generally believed, of the acid sap contained in the rootlets) attack the insoluble forms of plant-food, rendering them in turn soluble and capable of transmission to the various parts of the structure.

Of the mineral elements usually found in soils *six* may be considered as *essential* to plant-life, viz. potassium, magnesium, calcium, iron, phosphorus, and sulphur; others such as sodium, silicon, manganese, and chlorine, are generally found, together with aluminium, and occasionally with other ingredients in small quantity. That plants take these up severally by a selective power which they possess has been made abundantly clear, as, for example, in the taking up of potash salts in preference to soda salts when the two are present. Upon this, indeed, is based the whole system of manuring for the particular needs of particular crops. The analysis of the non-combustible or "ash" constituents of plants does not necessarily give the clue to the proper manuring to adopt for it, though it may afford useful information. But each plant has to be studied for itself and in relation to the power which it possesses of taking hold of and utilising the food constituents presented to it. Thus it has been shown that the wheat plant, though containing in its structure relatively large amounts of potash and phosphoric acid with comparatively little nitrogen, is really dependent mainly on the supply of nitrogen, and not on that of potash and phosphoric acid. So, too, the turnip, though it has very little phosphoric acid in it, has but small power of abstracting this ingredient from the soil, but depends largely upon its artificial supply in a soluble form. The same is the case with garden crops, the development of starch, *e.g.*, in the potato, or of sugar in the beet, being largely dependent upon the mineral and nitrogenous ingredients supplied in an available form. Nitrogen, moreover, is essential for the assimilation of carbon to go on.

As to what actually takes place within the plant in regard to the action of each mineral ingredient, but little is known. In the corn crops met with in agriculture we know that there is a gradual transference from the green parts of the plant, the stalk and leaves, to the flower and seed, and that these are, as the crop ripens, stored up mainly in the seed or grain, the stalk or straw then withering. But in horticulture—with but

few exceptions—this is not a matter of so much concern, the object not being, as a rule, the production of seed. Still, the requirements of the plant in respect of mineral and nitrogenous constituents are of importance here too, and not only healthy growth, but desired production of leaf or flower, as well as of flavour—as seen in the instances of fruits and vegetables—are dependent in no small measure on the proper supply of the essential and desirable ingredients through soil or manuring. As mentioned before, each plant needs, however, to be studied for itself, and no definite conclusions can be formed from analysis alone, either of the plant or of its ash constituents.

I have not unfrequently been asked to say, from the analysis of the ash of a plant—the violet is one I have at present in mind—what the proper manuring for it should be. This is, as I have pointed out, a question not to be answered from the examination of the ash alone, but has to be taken in conjunction with the soil on which the plant is grown, and the power which that plant has of attacking the various soil ingredients. In short, it has to be the work of experimental inquiry.

Phosphoric acid is, along with potash, an essential ingredient in seed production, and the pollen of plants is especially rich in phosphoric acid. The development of fruits, vines, hops, &c., would seem to be very dependent also on these two ingredients, and potatoes are much benefited by the use of potash salts.

Iron, though seldom wanting in ordinary soils, is an essential to the production of chlorophyll, and to its influence on the quality of the vine is attributed the excellence of many ferruginous soils. From time to time, indeed, there have come to the front those who have believed greatly in the benefits to be derived from the use of sulphate of iron and other salts of iron, and these latter have not unfrequently been made ingredients of horticultural and garden fertilisers. I cannot say that, for myself, I am satisfied as to the need of salts of iron as special applications; for iron is one of the most widely distributed constituents of the soil, it is invariably found in the ash of plants, and I do not know of anything to show that it is difficult of assimilation, but the contrary.

Lime is the next ingredient that calls for attention, and the experience I have had myself strengthens my belief in the great part which lime plays in plant development. While some soils have plenty of it (some, indeed, too much to make good horticultural soils), there are many others in which there is a decided lack of lime, and, speaking generally, I know of few more desirable ameliorations of soil than those that can be effected by the use of lime. Not only does it supply a necessary ingredient of plants, but its action in setting other constituents of the soil free to act as food, and in improving the mechanical and physical conditions of soil, is of the greatest service. Unfortunately, through the increased cost of lime, consequent on fuel being dear and carriage heavy, the “good old practice” of liming land has largely gone out, and I fear that in many cases the soil, deprived of lime by the continual use of artificial manures and forcing top-dressings, has been much impoverished, and can only be properly restored by the use of lime. A soil deprived of lime has a tendency to become “sour” or “acid,” and shows this in the prevalence of “finger-and-toe” in root crops, a fungoid disease

which thrives in an acid condition of soil. I have myself, at the Woburn Experimental Farm of the Royal Agricultural Society of England, been able to show that, by the continued use of nitrogenous top-dressings of sulphate of ammonia, the lime in the sandy loam that occurs there can be so far removed as to cause the land to become sour and no longer capable of producing a corn crop, whereas as soon as a dressing of lime is applied the fertility is once more restored.

While, however, lime may have this importance as regards farm crops, I am not forgetful that it may not have it to the same extent as concerns horticulture. The ill effects of "hard" water, *i.e.* water containing much lime, on heaths, azaleas, &c., has been mentioned, and the same applies to soils rich in lime, inasmuch as these plants will not grow upon them. So also with trees, for while some, beech for example, thrive on chalky soils, others, like elm and lime, will not do so well where there is much lime in the soil. Conifers, too, appear to be independent of lime. Absolute deficiency in lime and its presence in too great excess are, however, two very different things, and, while agreeing as to the unsuitability of the latter in certain cases, I cannot believe in almost complete absence of lime being productive of other than sourness and ultimate sterility.

Magnesia is generally associated with lime in a soil and, though an essential constituent, its supply would appear to be easily met, and its special application in manurial form is never called for. Sulphur is a constituent of the Brassicaceæ, and, as already noted, enters into the composition of albuminoids.

Silica is abundant both in soils and in plant structure, and yet there is no evidence to show that it is an essential ingredient. It enters largely into the formation of bark in trees. Other constituents, such as soda, chlorine, manganese, and occasionally lithium and other rare bodies, also occur in soils, chlorine mainly in the form of sodium chloride in plants of maritime origin, while soda, so long as potash is present, takes a subordinate place. The influence of manganese, lithium, and similar bodies requires to be still further studied, but there is evidence that, though not in themselves essential, they may yet exercise some benefit. Lithia, for example, is found largely in the ash of the tobacco plant. It would seem probable, from work recently done, that the influence of these rarer constituents will be found when they are used in quite minute quantities, and not as ordinary constituents of manurial applications.

Nitrogen, besides being supplied from the atmosphere to certain leguminous plants in the special way already described, is also conveyed to the soil by rain in the several forms of ammonia, nitric acid, and nitrous acid, and these, by the processes of nitrification and oxidation, are converted into nitrates, the form in which they become available for use by the plants, their absorption taking place through the roots. The change into nitrates is effected by the presence within the soil of one or more organisms known as "nitrifying" organisms, and the activity of which depends upon the presence in the soil of a base, such as lime, of oxygen, and of a suitable temperature.

Certain plants, such as *Drosera*, have the power of digesting nitrogenous organic matter supplied to them direct, and these are known as "carnivorous" plants, while others, such as the great class of orchids,

derive their nutriment from the atmosphere alone, and are not dependent on the soil or its constituents.

Mention should be made here of certain constituents which may prove hurtful to vegetation. Saline matters, if present in excess, will render soil sterile. This is seen in the case of the salt plains of India and of land in process of reclamation from the sea; similarly, plants to which salt has been too freely added, or which have been watered, as in the instance recently quoted, with water containing much salt in solution, may be injured. Ferrous salts and sulphides, again, are harmful constituents of soils, and their occurrence is the result largely of imperfect cultivation and want of aeration of the soil. By the entrance of oxygen these constituents will become oxidised and rendered harmless; lime also is a potent agent in improving such soil.

THE SOIL.

The soil may be regarded, in the first place, as the material which holds up the plant, and, in the second place, as that which supplies it with food. Soils differ greatly in character, according to the nature of the rock or source from which they are derived, or the transport which the particles have undergone. To the agriculturist these distinctions are very material ones, for according to them he must shape the course of farming he is to pursue. He has to take his soil as he finds it, and grow his crops as he thinks most suitable; his crops, too, must be regulated by the class and quality of the soil. It is impossible for him to modify, on any practical scale and at any reasonable expense, the texture of his soil. To the horticulturist these differences of soil do not present such difficulties, for he is able to a great extent to modify the character of the soil, and to obtain for each kind of plant the soil that is best adapted for it. It is an easy matter to procure for cuttings or for bulbs the sand that they do so well in, or to make use of leaf-mould or peat, and it is only on the larger scale, as in a vegetable garden, where the difficulty enters, for there the gardener is expected to produce each kind in its turn whether the soil be suitable or not.

It would be foreign to my purpose to go at any length into the characteristic features of soils of different kinds, or to set out their general chemical composition; this is a matter rather for the agriculturist than for the horticulturist. The principal classes are sandy soils, loams, clays, chalky soils, and peaty soils. Sandy soils are generally poor in the essential mineral constituents, potash and phosphoric acid, as also in lime; loams, which may be regarded as mixtures of sand and clay, are, all round, the most useful soils for the gardener; clays have the greatest reserve of plant food, but require to be well cultivated in order to make this available—they are usually very rich in potash; chalky soils, if not too rich in lime, may make good soils if well broken up, and are much improved by the addition of humus—if over-abundant in lime they are very apt to “burn”; peaty soils are very rich in vegetable matter, very retentive of moisture, but generally poor in lime and mineral matters.

The relation of soils to water and to heat has already been briefly

considered, but to the gardener this does not present the importance it does to the agriculturist, as he has the means of controlling it to a great extent. The nature of the subsoil requires, however, to be taken into account, and for fruit trees and hops a deep soil of somewhat heavy nature is an essential. Roses also require a heavy soil, but potatoes and carrots do best on sandy loams, and peaty soils are most suited for heaths, azaleas, and rhododendrons, as also for foliage plants and ferns. So many, however, are the variations which the gardener is able to effect in the texture of the soils he has to do with that it is unnecessary to dwell longer on this point, especially as it is one affecting the mechanical and physical conditions rather than the chemical nature or constituents of the soil, or the supply of plant food. In all these cases, however, it is essential to keep in mind the securing of proper drainage, without which there will be want of aeration and oxidation, and the cessation of those processes which go on in the soil resulting in the setting free and taking up of nutrient matter.

MANURE.

The next subject for consideration—in its chemical aspects—is the supply to the soil, by means of manure of one kind or another, of those constituents necessary or desirable for the plant, but lacking in the soil. To this subject an entire lecture might quite well be devoted, and it is not my present object to do more than touch on general points involved in the use of manures. Manures may be considered as of two main kinds—natural and artificial. Under the former head are included the most general of all—farmyard or stable manure, decaying vegetable and animal matters, such as leaves, garden refuse, and nightsoil, and waste materials like soot, shoddy or wool, hoofs and horn dust, dried blood, wood ashes, &c. Under the second head come the products of chemical manure factories—superphosphate; bones in their various forms, raw, steamed, and dissolved; mixed artificial manures; basic slag, &c.—and other substances, either imported or prepared, which may be termed “chemical fertilisers.” Among these are Peruvian and other guanos, nitrate of soda, nitrate of potash, kainit and other potash salts, common salt, &c. Other materials again there are which are used partly for manurial benefit, but largely also for the mechanical and physical improvement that they effect on soils: of this class are lime, compost, pond mud, sewage sludge, &c. The most general manure is, of course, farmyard or stable manure, and this is of varying character and composition according as whether it be made from horse dung, cattle dung, or pig droppings, and according to the kind of absorbing material, or litter, used—be it straw, peat-moss, or earth. The essential feature common to all is that the manure practically supplies all the ingredients necessary for the growth of plants, though it may still be the case that these may require supplementing, for special cases, by the use of artificial manures which give a more abundant supply of a particular ingredient, such as potash, phosphoric acid, or readily available nitrogen. Farmyard manure may be used either fresh or in a thoroughly rotten state. In the former condition it is most serviceable for the amelioration of heavy

land and the production of a better tillage, but on light land and for gardening purposes generally it is best employed in a well-rotted condition. Horse dung is considered a "hot" manure, while cattle or cow manure is cooler. Pig manure is valued especially for fruit trees. One of the chief advantages of farmyard manure is that it helps to retain moisture in the soil, the manure adding humus to the soil and making it thus more retentive.

On the farm the value of farmyard manure is fully recognised; the difficulty is that there is not enough of it; such difficulty, however, does not, as a rule, present itself to the market-gardener or the horticulturist, and, in the case of market-gardening in particular, the soil is so constantly and liberally stored with fresh supplies of stable dung and vegetable and animal refuse as to practically transform the original condition of the soil and to make it one rich medium of plant food for many years to come. It is on account of this that the additional manuring effected by the use of artificial fertilisers has to be considered in quite a different light from that which rules in the case of the supply to farm crops. In the latter, economy has to be strictly observed, the soil is not previously enriched with accumulations of farmyard and other manures, and it is practicable only to give such artificial help as shall be able to bring in a paying return in the increased crop. Nevertheless, even in the case of garden plants there is frequently an advantage in the use of chemical manures. Thus, vines, fruit trees, and potatoes are all benefited by the application of phosphates and potash in greater quantity than even a liberal use of farmyard manure can supply; while for succulent vegetables, that are intended to make rapid growth, nitrate of soda or Peruvian guano give a useful stimulus. Bones are used for vines and fruit trees, along with potash salts, of which perhaps sulphate of potash is the best form; and for potatoes superphosphate of lime, with sulphate of potash and sulphate of ammonia, makes as good an artificial dressing as can be desired.

In general, it may be said that the effect of phosphates and potash is to produce quality, while that of nitrate of soda, sulphate of ammonia, and similar forcing manures is to produce rapid growth and stem and leaf development. With the latter comes a retarding of the ripening period. In the application of chemical manures to flowering plants these points require to be carefully borne in mind.* In the case of grass it has been shown by the Rothamsted experiments how entirely the character of the herbage can be altered by the use of artificial manures, the tendency of quickly acting nitrogenous manures being to increase the grasses at the expense of the clovers, and to bring about a coarse growth of the grasses, while the application of manures of phosphatic and potassic nature is to produce a mixed herbage, potash salts in particular benefiting the clovers. Hence, in the case of a lawn, when a gardener wants to get a fine mixed herbage with clover it is not well to apply liberally such quickly acting nitrogenous manures as nitrate of soda or sulphate of ammonia, but to employ materials containing phosphates and potash, such materials, *e.g.*, as bone meal and sulphate of potash, and what nitrogen is applied should be in the form of organic materials which decompose slowly and yield their nitrogen

gradually. Where, on the other hand, clover is not desired, but grass only, then the potash should be omitted; and if rapid growth of grass be required, then the more active forms of nitrogenous manures may be applied.

A material that came under my notice, and which was sold as "lawn sand," was found to be nothing more than sand with sulphate of ammonia added. Basic slag is a manure that has lately come much into use for grass land, and answers particularly well on poor heavy clays, the effect produced by it on the herbage being in many cases very remarkable. It is impossible, however, to tell with any certainty beforehand whether basic slag is likely to succeed or not, and this should always be a matter for experimental trial on a small scale first. For garden crops I am inclined to question its value, as also for the corn crops of the farm, it being slow in its action, and I consider that it is most usefully employed on grass land of the kind above stated.

Of the value of lime I have already spoken, and either alone or in a compost heap with earth it forms a most valuable material for improving the mechanical condition of the soil, rendering heavy soil lighter and imparting needed "substance" to light and sandy soils. Pond mud, sewage sludge, nightsoil, and the like, have the objection of being, as a rule, difficult to handle, and their best destination is generally the compost heap, which will receive, together with them, vegetable refuse of every kind, and by mixing with lime and occasional turning over form a useful mixture for top-dressing purposes. For destruction of weeds on land, or on compost heaps, gas lime is a useful substance, but care must be taken when it is spread on land that it be thoroughly exposed for some weeks and not come in contact with any growing crop, or the injurious ingredients it contains will be sure to kill the crop. The value of soot consists, from a manurial point of view, in the sulphate of ammonia which it contains, added to which it undoubtedly possesses other qualities which make it destructive of insect life. Salt is frequently employed for plants such as cabbage and mangel, and exercises a useful function in attracting moisture.

Were I to enter into a description of the different fertilisers which are in common use or have been put forward for horticultural purposes, I should have to write a separate paper on this subject alone. Suffice it, for the present, to say that some of them are undoubtedly good, some of doubtful value, and others not worth anything like what is charged for them. Of all the materials which most nearly represent a general manure like farmyard manure, but supplying the ingredients in concentrated form, Peruvian guano is the best, and this is perhaps the most common constituent in special horticultural manures. It has often been urged, and with some reason, that horticultural manures are sold at extravagantly high prices in no way approximating to their actual cost. This is, no doubt, true in many cases, but, strong opponent as I am of "specialities" in fertilisers, and doubtful as I am in general of their particular virtues, it is yet right to point out that the conditions of preparation, sale, and distribution of these is very different from what obtains in the sale of fertilisers for farm crops and for use on a large scale. One must not expect to get a tin or a packet of some fertiliser at anything like the rate

at which he pays for a ton of the same. The Fertilisers and Feeding Stuffs Act does not take into account purchases of less than half a hundredweight, and horticultural fertilisers practically do not come within its scope. There is no reason, however, why, where manure is used in quantity, purchasers should not avail themselves of the provisions of the Act and obtain the definite guarantee of the fertilising ingredients and the quantity of each present which the Act compels to be given; this should also be invariably done in purchasing chemical manures such as superphosphate, bones, basic slag, kainit and other potash salts, Peruvian guano, nitrate of soda, and the like. In all such cases the help of the chemist can usefully be employed, and even as regards the many "specialities" sold, and which people will always *insist* on having, it would be well to ascertain, by chemical examination, whether these are (1) suitable for the purpose; (2) whether, all things considered, their cost bears some reasonable relation to their intrinsic worth.

OTHER DEPARTMENTS OF CHEMICAL WORK.

There remain to be briefly noticed some other spheres in which chemistry may usefully come in to aid the horticulturist. In the treatment of insect and fungoid attacks on plants a great variety of substances are used, all of which require to be watched in order to see that they really are what they are represented as being, and that they are likely to be efficacious. Moreover, it is often the case that these are inferior or even adulterated. Under this head come such materials as flowers of sulphur, soft soap, preparations of tobacco, sulphate of copper, and preparations of it with lime for spraying potatoes and tomatoes, soot, rape dust, lime in its different forms, chloride of lime, carbolic acid and other disinfectants. Sulphate of copper has frequently been found to be adulterated with the much cheaper sulphate of iron; soot, again, is a most variable material, and if purchased can seldom be depended upon. Another class of articles are the many sold under the name "weed-killer," and in most of these arsenic compounds figure.

In the building and renewal of greenhouse and other structures paints form a not inconsiderable item, and it is well to make sure that the quality of these is what it should be. I have had to examine many samples of white lead, and in not a few instances I have found these to be largely made up with adulterating materials such as sulphate of baryta, sulphate of lime, &c.

CONCLUSION.

While I have endeavoured in the foregoing to put out some points in which a knowledge of chemistry may be made useful to the horticulturist for the better understanding of the processes which go on in plant life and growth, and for the application in practice of the principles which have been laid down, it is only right that I should in conclusion indicate some of the limitations which have to be put: in short, to name some of the things which chemistry *cannot* do. First among these I would admit that chemistry has as yet failed to give any explanation as to why one plant likes this or that particular ingredient, or rejects one or the other.

What the particular ingredients do in the plant structure, or how their absence would be felt, remains still a matter of further inquiry. So, too, there has not yet been given any adequate explanation as to why one plant will grow on a particular soil and not on a different one, why potatoes, for example, will grow well on a sandy loam and not on a heavy clay, while fruit trees and hops need a fairly heavy soil. Again, chemistry has not yet solved the question of how to produce quality and flavour without the sacrifice of quantity. In what, indeed, quality and flavour consist is itself still a mystery.

These and other points which I might bring forward show that there is still a wide field open for the pursuit of inquiry—inquiry of high importance to horticulturists, and in which chemical science may well take its part.

THE HOLLIES.

By E. T. Cook, F.R.H.S.

Lecture given on August 29, 1905.]

HOLLY plays a most important part in our winter landscape. It is true that not one of our native evergreens could be spared from either hill or dale without a sense of grievous loss. Spruce and pine, juniper and yew, and trailing ivy—each has its distinct value, and each in its own way is very beautiful. But one and all of them are sad. We do not feel it when the glow of the summer sunset lights up the red stems of the Scots fir, nor when the murmur of the west wind croons softly in the spruce boughs above our heads on a warm summer day. We may even turn away from the dazzling colour of flower-borders to the cool sylvan green of juniper, or gladly take shelter from scorching noonday sun under the dim shade of the solemn yew, and never once think of sadness. But reverse the picture, and recall how all these look under a gloomy November sky, with fog-clouds hanging low and chill over the hilltops, and say then if we are not ready to confess that one and all are more or less funereal. Exactly the same effect is given by some of the evergreen trees of other latitudes. The "gloomy vegetation of the forest" at certain seasons at the antipodes has often been remarked; but we seldom realise, whether at home during winter, or its corresponding rest-time in milder climates, that it is the dead calm of arrested life all about us that holds us in its grip. Most evergreens betray it even more than deciduous trees, which, to a watchful eye, are never wholly asleep. Nor is this to be wondered at, for it is in fact owing to the more complete suspension of vital force during their resting-time that conifers and other evergreen trees are able to hold their leaves. But, nevertheless, there is no dead calm about the holly. Rude health and vigour are written upon it at all seasons, and the cheerful glint of its polished leaves and the red glow of its berries do more for our English landscape than we are apt to imagine. Like the "pink" of the fox-hunter, it saves our English countryside—and very often our sinking spirits as well—from overmuch depression.

In no other country does holly thrive as it does with us, and for that reason, if for no other, we should make it a main feature in our English landscape, encouraging it in those localities where it is naturally abundant, and planting and cherishing it elsewhere.

The winter outlook from our windows is quite as important to us as individuals, if not more so, than the distant view. We surround our houses with rhododendrons and all manner of exotic evergreens, and they all have, as we are most ready to acknowledge, their distinct beauty and advantages. We may, however, be suffering from a plethora of *Rhododendron ponticum*, for example, which year by year is rising into a dense wall and threatening to shut out light and air, and which gives a sense of oppression that must be lived in to be felt or understood.

Sound advice was given recently by a writer who advised that rhododendrons should be kept for middle distances. There they make a fine effect in the landscape, winter and summer. Hollies, on the other hand, where there is space enough for tree-planting at all, may be stationed either near or far, and their effect on the outlook never becomes gloomy or oppressive.

Our forefathers were fond of planting belts of forest trees as a protection to their dwellings, or, maybe, they planted their dwellings within the sheltering embrace of trees already grown, for in many cases these encircling groves are more ancient than the buildings they surround. We can all call to mind some old-time manor-house, shut in by gaunt, leafless trees, set, evidently with intention at the outset, rather close together, but which, through neglect of later owners, have never been properly thinned out or allowed room for development. Who has not felt on occasion that the shelter afforded by such skeleton trees, tossing their lean branches against a leaden sky, is somewhat dearly bought, even on a winter's day, at the expense of ghostly gloom and damp depression? What a change for the better, under these and similar conditions, might follow a liberal use of hatchet and saw, and a careful grouping amidst the survivors of the best varieties of bright-leaved holly!

Those who are thinking of any new planting of trees and shrubs in garden, coppice or hedge, might do well to think over its good qualities before going further afield for a choice. In this hurrying age we cannot wait for anything that seems to loiter, and perhaps it is partly for this reason that holly is not planted as it used to be. But partly, also, it may be that our minds are led astray by the innumerable foreign trees and shrubs which are now within our reach, and clamour for space in such planting ground as may have fallen to our lot. It is not now the same easy task to us as to our forefathers to decide what will be the most in concord with the position it has to fill. One of the first canons to be considered in planting is congruity, and that not only for the present, but in the future; yet in everyday practice this principle is constantly set aside. But, in making choice of this fine native tree, we can hardly go wrong, so long as we can afford it room enough for free development. Like many another common thing, as old as the hills, in Nature, it will often give us a glad surprise as we notice some feature, unsuspected hitherto, which comes upon us suddenly with all the force of a new sensation. There is a lovely stretch of woodland known as Cranborne Chase, which reaches from the high Dorset Downs till it merges itself in the New Forest. The uplands, fringed with hazel coppice, can boast of no alluvial richness. A thin crust of earth lies spread over pure chalk, yet in this dry, hungry soil, which is certainly not over favourable for the development of height or girth in ordinary forest trees, the hollies rear their grey trunks above the tall nut-bushes, and lend beauty to the landscape, far and near, which would be sadly marred without them. Except in waterlogged land, they will thrive in any soil or aspect, though they return grateful thanks in kind for good, deep, sandy loam and an average supply of moisture, not omitting when necessary mulchings of rotted manure. Transplanting or any other operation that involves root disturbance should be carried out in May, no matter what

the weather may be. Mulch the plants, and give them a good watering, with gentle syringing over the leaves on fine evenings.

As a specimen, on a wide lawn, with branches feathering down to the ground, few things can exceed the fine symmetry of the finest green-leaved hollies, though amongst the host of garden varieties which have been raised, many of them most beautiful in their variegation, there is abundance of choice to satisfy the most exacting taste. We all love the glowing berries which help to light up the winter day, but the creamy foam of holly flowers in spring scarcely ever receives its due measure of praise.

Take it year in and year out, few trees, home or foreign, keep their beauty at all times like the holly; and not only can it be used as a single specimen or in a well-placed group in a pleasure-ground, it is quite as invaluable in the home copse, filling spaces under larger trees where nothing else will flourish, and giving just that invigorating touch of warmth and brightness to the woodside, by the glint of its polished leaves, which is the prerogative of no other British evergreen. The best varieties for specimens on the lawn are 'Weeping Silver,' *maderensis* *Shepherdii*, and 'Handsworth Silver.'

Nothing, again, in the way of an impenetrable fence can beat a well-grown holly hedge. A double row of strong nursery plants, from three to four feet high, set fairly close together and well mulched over the roots as soon as planted, with a thick layer of old farmyard manure, will make wonderfully good progress in three seasons, and after that will increase yearly at a rate of six inches to eighteen inches in height according to the rainfall. They should be pruned with a knife during the earlier years of planting, and later on it is a matter of taste and judgment how much clipping and trimming will be appropriate. Pruning should take place just before they start into growth in spring. In some positions close shearing is indispensable, and nothing stands such drastic treatment better. Even a hedge that is intended to form a screen on the outskirts of a plantation, or any other position where such a feature is desirable, is greatly improved by the use of the knife in the earlier stages, to close the plants, so to speak, and furnish them with shoots from the bottom. The most suitable varieties for hedges or for growing under trees are: *Shepherdii*, *Dahoon*, and the broad-leaved hybrids from named sorts. These are not named varieties, but seedlings from them which are natural hybrids. The large collection of named hollies to be seen in Messrs. Fisher, Son & Sibray's nursery at Handsworth, Sheffield, lends itself to the production of a race of hollies that would appeal to the most fastidious, either for making hedges or for creating beautiful effects in woodland and pleasure grounds. The foliage is very fine, the growth rapid, and the berries bright and profuse.

A note by the Editor of "Flora and Sylva," in that journal, upon the importance of the holly for hedges and shelters, I may well quote, as it is the outcome of great experience with this beautiful evergreen. "In too many places in our country there is the unfortunate use of the iron fence, which has neither beauty nor endurance, and is useless for shelter. A well-made live fence will last three times the life of an iron one; and of all possible living evergreen fences the best is holly, in close

but not stiffly-clipped lines. Better still is the free unclipped holly hedge, as it makes a fine shelter as well as a good background, of which there is a fine example above the kitchen garden at Batsford Park. In Warwickshire and other counties we have often seen it making as good a shelter round fields as any shed. Of the clipped holly hedges fine examples are at Woolverstone in Suffolk. Where land is not valuable—either from its poverty or elevation, or other reasons—it matters little whether the hedge is clipped or not, especially round woodland, and for cutting off woods and pasture fields. For such a case the finest hedge is that of unclipped holly, because then we get its fruit and protection and fine form. Such hedges might be either of holly alone or mixed with sloe or quick." Another remarkable hedge is on the western boundary of the gardens at Keele Hall, Staffordshire.

An enemy of the holly hedge is the rabbit, but in hard winters many other trees and shrubs suffer from this pest, and even the bark of the beech trees is consumed.

The writer referred to also remarks: "Holly is found flourishing on dry gravelly land as well as on strong clay, but sand and sandy loam are the soils it delights in most. On flat ground the site intended for the holly hedge should be trenched and manured before the time of planting, but the chief thing is to have the soil open and fertile, and nothing can be better as an addition than well-rotted farmyard manure; the same should be used for mulching after planting.

"The distance between the plants should be at least a foot, and, if they are very bushy, fifteen inches apart will be close enough. In order that they may stand firm and upright they should be trodden gently immediately after the roots are covered."

It is pleasant to see in a well-arranged group of hollies the beautiful gradation of green, sometimes almost harsh in intensity, passing to paler shades with a suspicion of soft grey. We seldom think of the beauty of leaf-colouring, the harmony of shades that the play of light on the stiff vigorous foliage brings out, and the rich diversity in the size and strength of scarlet in the fruits. But the holly has all these virtues, and they add to the enjoyment of a carefully chosen collection. This difference in colour and form is evident in the beautiful natural hybrids which are to be seen at Handsworth, all well-marked variations of the greatest use in the planting of groups in garden and woodland.

VARIEGATED HOLLIES.

When we think of the many miserable variegated trees and shrubs, which are a blot on the garden and landscape, and neglect of the finest variegated hollies, it is sufficient to make the true garden artist weep.

Ilex Aquifolium argentea (the Silver Hollies).—Several beautiful-leaved hollies may be placed under this heading. They have a creamy colouring, and include some of the most striking of all hollies. *Argentea marginata*, which is the old Silver Holly, is a variety of very quick growth, hardy, and producing berries freely.

Argentea pendula is bright in colouring, and graceful in growth, a beautiful weeping holly for the lawn.

'Handsworth Silver': a striking holly with long silvery margined leaves and a wealth of splendid berries. If we were restricted to one Silver Holly this would be the variety selected, on account of its display of berries, as compared with 'Silver Queen' (*Argentea Regina*), a very fine holly, but without the charm of 'Handsworth Silver.' The variety *grandis* is very bright and desirable, but it is little known in British gardens, although well worthy of a place.

Under the varietal name of *Aurea* the Golden Hollies are placed, and *Aurea marginata* is the type.

The 'Golden Queen' (*Aurea Regina*) is the jewel of this group and should be the first chosen. The growth is strong, and the leaf is almost wholly of a soft golden colour. It is delightful either as a single specimen on the lawn, or in a large group in the shrubbery. It deserves a prominent place, and as a golden variegated tree is unrivalled for beautiful winter colouring. Another handsome Golden Holly is *Compacta Aurea*, or *Watereriana*, which has very bright variegation, and is suitable for small gardens, or where it is desired to keep the specimens within certain limits. The weeping form of the 'Golden Queen' Holly is also excellent as a lawn specimen, and a variety of recent introduction named 'Madame Briot' has variegation almost as bright as 'Golden Queen,' while the growth is strong, and the berries bright and profuse.

A REVIEW OF THE GENUS.

This is in no sense a monograph of the genus: that may well be left to other hands; but I thought a brief review of the genus would interest readers of the Society's JOURNAL.

Hollies, as they are commonly known in this country, are so typically evergreen that the term "evergreen" may appear superfluous. There are, however, numerous deciduous hollies. *Ilex* is a large genus, comprising probably upwards of two hundred species, which are scattered widely over both tropical and temperate countries, being found on almost all the great land areas of the globe. About twenty species can be grown in the average climate of Great Britain, and eight of these are true evergreen hollies. The deciduous ones belong chiefly to the group formerly known as *Prinos*, and are shrubs notable mainly for their handsome fruits, especially the brilliantly coloured *I. verticillata*; they are not, however, much grown nowadays. The eight species mentioned are as follows: European: *Ilex Aquifolium*; Asiatic: *I. cornuta*, *I. diphyrena*, *I. latifolia*, *I. crenata*, *I. integra*, and *I. Pernyi*; American: *I. opaca*. The flowers of these hollies are small, white or greenish, and are not attractive.

We now come to the wayside and woodland holly, our cheery *Ilex Aquifolium* and its varieties. Among all the introductions from other countries and climates that have poured into this country during the last 150 years, our native holly still holds its own as one of the best, if not the best, of all evergreens for general planting in the gardens of Great Britain. It is naturally a tree from 30 to 50 feet in height (Loudon mentions examples 60 to 70 feet high), but it can still be kept permanently at the size of a small bush a few feet high by pruning. It has sported into numerous and varied forms, and in colour, in shape, and

in size of leaf, as well as in growth, one may find almost every form that cultivated plants assume among the garden hollies. Thirty years ago the late Thomas Moore monographed the varieties of the common holly in the "Gardeners' Chronicle," with the help of the leading cultivators of holly in the United Kingdom. Even at that time he was able to name and classify 150 varieties.

Although, like many monographers, Moore probably over-divided his material and relied too much on unimportant and transient characters, his was a genuine and valuable attempt to classify the garden hollies. The fine collection of hollies at Kew is named in almost complete accordance with Moore, and his nomenclature has been followed in the "Kew Hand-List." In the following notes a representative thirty-nine varieties are briefly described :

The six best varieties are *camelliaefolia*, *compacta aurea*, 'Golden Queen,' 'Handsworth Silver,' *platyphylla*, *Shepherdii*. The six next best are *argentea marginata*, *handsworthensis*, 'Handsworth's New Silver,' *Hendersonii*, *maderensis*, *Wilsonii*.

ILEX AQUIFOLIUM.

Var. *attaclarensis*.—This is a large-leaved variety, dull green, with regularly placed spines on the margin. The bark is dull purple. The variety is represented by a good specimen at Kew, measuring 25 feet in height and 18 feet through.

Var. *angustifolia*.—A green variety, the small, narrow leaves marked with the large, weak spines set on portions of the margin. It is of slender growth, and can be distinguished from other varieties of a similar type by a large proportion of its leaves having the terminal one-third without spines.

Vars. *argentea* and *argentea regina* are the Silver Hollies described previously.

Var. *atrovirens* (*nigrescens*).—One of the big-leaved Hollies, the foliage being dark, shining green, and stout in texture.

Vars. *aurea*, *aurea marginata*, *aurea medio-picta*, *aurea pendula*, and *aurea regina*, all of the Golden-leaved group, have been already described.

Var. *camelliaefolia*.—This is a favourite holly of mine, and is sometimes catalogued as *laurifolia longifolia*. It is a beautiful variety, the large leaves glistening in the sun, and they are conspicuous in having very few spines, frequently none at all. Its name is suggestive of the leaf character. The berries are very fine.

Vars. *ciliata* and *ciliata major* have long, slender spines standing well away from the body of the leaf. The variety *major* is more vigorous than the former, and has larger leaves, but *ciliata* is a neat-habited and pretty variety.

Vars. *crispa* and *crispa picta*.—These have a curious spiral twist to the leaves, which are thick in texture, and dull green in *crispa*, but blotched with yellow in *crispa picta*. These two hollies are sometimes called *tortuosa* and *tortuosa aureo-picta* respectively.

Var. *dorsetensis*.—A graceful holly, which is distinguished by leaves of quite a purplish shade of colour. They vary in form, but this trait adds to the interest of the shrub.

Var. ferox (Hedgehog Holly).—A curious variety with medium-sized or small leaves, distinguished by having spines not only on the margins but also clustered on the convex surface. *Ferox argentea* has white spines both at the margins and on the surface, and that part of the leaf from which they spring is also white; *ferox aurea* has a large blotch of yellow on the leaf, but the spines are green. All three varieties are marked, not only by the formidable armature of the foliage, but also by the recurved margins and "curly" leaves.

Var. Fisheri.—Mr. Bean writes: "Whilst many of the leaves of this holly are like those of the ordinary form, only larger, and having bigger and more irregular teeth, others are remarkably distinct in having a narrow triangular shape, and tapering gradually from the truncate base to a fine point, the margins being almost or quite unarmed. The largest leaves are 4 inches long by 2 inches wide."

Var. flavescens (Moonlight Holly).—This is strongly reminiscent of our common holly, but the young foliage has a delicate yellow tinge. The effect of this peculiar colouring suggested the popular name of Moonlight Holly.

Var. fructu-luteo.—This is distinguished by bright yellow berries, and is for this reason an interesting shrub. When seen in certain lights it is almost as fascinating as the common red-berried holly. Nothing is more beautiful than a well-berried specimen of the common red-fruited holly in bright weather, but in dull, sunless, or murky weather this yellow-fruited variety is the more effective.

Var. handsworthensis.—This is sometimes described as a variegated variety, but the true *handsworthensis* has small spiny leaves quite distinct, and dark shining green in colour.

Var. latispina.—A holly distinct in appearance and vigorous in growth. The leaves are sometimes without, and sometimes with, spines, which are conspicuous for size and a curious twist.

Var. maderensis variegata.—Like the golden *Lawsoniana*, this is not very constant, and perhaps it is not advisable to plant it, at least freely.

Var. Marnockii.—A beautiful variety raised in the Handsworth Nurseries. It has a leaf of intense colour, almost spineless, 4 to 5 inches long, and a dark glossy colouring. A noble holly, especially when in flower.

Var. monstrosa.—This has leaves 4 inches long, spiny, and deep green.

Var. Mundyi.—This variety has stiff leaves, each of which is dull green, 4 inches long by $2\frac{1}{2}$ inches broad; the growth is strong and erect.

Var. myrtifolia.—As suggested by the name, this has myrtle-like leaves, from 1 to $1\frac{1}{2}$ inch long, and sometimes toothed. Its growth is neat and slow. The var. *aurea* is so named because of the golden edge to the leaves.

Var. ovata.—One of the most distinct of all the forms of *Ilex Aquifolium*. It is close and not very quick in growth. The ovate leaves measure 2 inches in length, with a width of $1\frac{1}{2}$ inch; they are very stiff, and have small spines.

Var. pendula.—The Weeping Holly is one of the most beautiful of lawn trees. Several examples may be seen in gardens, and one on the

lawn at Kew has been frequently figured. Growth is not very rapid, but it is worth while waiting until the graceful branches sweep the grass.

Var. platyphylla.—A holly with large dark green leaves, of thick texture and strong growth. The fruits are conspicuous for size and rich red colouring.

Var. recurva.—The chief characteristic of this holly is its twisted and channelled leaves, and large spines. It is more curious than beautiful.

Var. scotica.—A well-known holly of quick growth, and entirely without spines to the deep-green leaves. The *var. aurea* has a golden margin to the foliage.

Var. Shepherdii.—A large green-leaved, vigorous variety, the leaves being elliptical or broadly ovate, and as much as 4 inches long by nearly 8 inches wide; they are armed with strong spiny teeth. The bark is purplish. A well-known and much-prized holly.

Var. Wilsonii.—This is one of the finest of hollies, and I hope it will be largely planted. It was raised in the Handsworth Nurseries, and has very large, glossy leaves of a peculiarly beautiful shade of green. No variety has larger fruits, which cluster thickly on the shoots. A specimen in full berry is a cloud of scarlet against the sky.

I. CORNUTA.

A holly from China, and discovered by Fortune near Shanghai. It is one of the more tender species. Mr. Bean writes of it: "It is apparently much dwarfer than our native holly. I have not seen it more than 7 or 8 feet high, although specimens much larger than that no doubt exist, in the gardens of the south-west especially. It is not suitable for the colder parts of the kingdom, although at Kew I have not seen it seriously injured by frost. In habit it is a compact rounded bush, which, if left unpruned, is usually broader than it is high. Its leaves are leathery in texture, of a very dark glossy green, 2 inches to 4 inches long, and somewhat rectangular in outline. The terminal portion is armed with three large spines, and there are two also at the base. Usually, but not invariably, there is a decurved spine at each side, near the centre of the leaf. The number of spines therefore is usually five or seven, but curiously Lindley and Paxton show only three in a figure in the first volume of 'The Flower Garden.' The fruit, which is not freely produced, is round, larger than the common holly-berry, and red. It is distinguished by handsome, lustrous foliage, and shapely growth."

I. CRENATA.

A Japanese holly, which Sargent says is the most widely distributed and abundant of the evergreen Japanese hollies. It is indispensable to the well-planted garden because of the compact growth and rich shade of green of the leaves. Severe side-pruning is necessary to promote height, and then it makes a delightful specimen. The fruit is black and not abundant. The Japanese train the shrub into quaint shapes, much as the yew and box are treated here.

I. DIPYRENA.

A Himalayan holly, and seldom hurt by frost. There is a very fine example of it at Kew, 20 feet high and 12 feet across. This was uninjured by the great frost in February 1895, but Mr. Bean writes that the late Mr. Truelove, who for many years had charge of the Arboretum, told him that it had been once killed back to the ground-level. In the Himalaya Mountains it grows to a height of 40 feet. The fruit is red. An interesting holly, but not of great importance to the English gardener.

I. INTEGRA.

Othera japonica and *Ilex integrifolia* are other names for this Chinese and Japanese holly. It is of pyramidal growth, and reaches here a height of 15 feet, with a diameter of 7 feet, but in its native lands it is twice those dimensions. The large red berries are apparently more abundant in the south than elsewhere.

I. LATIFOLIA.

Unfortunately this beautiful Japanese holly is too tender for general planting here, but it deserves mention for its magnificent leaves, which are frequently 8 inches long and 4 inches wide. It is the holly of Japan, and it is to be regretted that our climate is too cold for it. When planted it must have a sheltered fence, such as has been given to it at Kew, where a specimen has been in the open for many years uninjured.

I. OPACA (AMERICAN HOLLY).

A handsome species, and when fully developed is 40 to 50 feet high, with a trunk about 8 feet in diameter. This holly was introduced from the United States into this country by the Duke of Argyll in 1744. Mr. Bean says: "Probably there are big specimens in the country, but I have not seen any myself approaching the heights given above, which are those of native trees. Of the several representatives in Kew, the largest is about 25 feet high and 16 feet through. It would be interesting to know of any large specimens that may exist. It is easily distinguished from other hollies of its size by the dull 'opaque' aspect of dark green foliage. No varieties of it appear to exist in cultivation, although Sargent states that its berries are sometimes, though rarely, yellow."

I. PERNYI.

I wrote to Mr. Wilson for information about this holly, and the reply was as follows: "This species was first discovered by Père Perny about 1858, in the province of Kwei-chau, Central China. Generally speaking this holly is a shrub 4 to 6 feet high, of stiff and erect growth, and the leaves are much like those of *I. cornuta*, only about one-third the size. The berries are red and clustered in the axils of the leaves. The plant is very spiny, and should make a good subject for hedges or for specimens on the lawn. So far it has proved perfectly hardy in this country. This species is common on shrub-clad mountains in Central and Western China

at an altitude of between 4,000 and 7,500 feet. I sent seeds of it to Messrs. Veitch in the winter of 1900, and at their Coombe Wood Nurseries a stock of young plants may be seen."

Before I conclude this lecture, I must acknowledge my indebtedness to Mr. William Atkinson of Handsworth, Yorkshire, in whose nursery many of the finest varieties were raised. Noble specimens of the parent forms may be seen there, and to the students of this beautiful genus these are of great interest and importance. Mr. Bean, the Assistant Curator of the Royal Gardens, Kew, has also kindly assisted me.

ON THE AMERICAN GOOSEBERRY-MILDEW, AND THE NEED FOR LEGISLATION.

By ERNEST S. SALMON, F.L.S., Hon. F.R.H.S., South-Eastern Agricultural College, Wye, Kent.

I.—THE SPREAD OF THE DISEASE IN EUROPE.

IN vol. xxix. of the present JOURNAL, appearing in December 1904, in a paper entitled "On the Present Aspect of the Epidemic of the American Gooseberry-mildew in Europe," I gave an account of the spread of this disease up to that date. At that time Ireland, Russia, and Denmark were the only European countries in which the disease had been observed. I pointed out in this article (*l.c.*, pp. 102, 108) that the circumstances attending the outbreak of the American gooseberry-mildew in Europe, and the course the disease has since followed, were entirely similar to those of the early stages of the epidemic of the vine-mildew—the well-known *Oidium Tuckeri*—a disease which appeared first in Europe in 1845, at Margate, and by 1858 had spread over almost the whole of Europe, devastating every vineyard in its path. The facts now to hand show that the American gooseberry-mildew (*Sphaerotheca mors-uvæ* (Schwein.), Berk.), recently introduced into Europe, is still steadily increasing its area of distribution, just as the vine-mildew did after its first appearance. Sweden, Norway, Germany, Poland, Austria, and Finland are now to be added to the European countries in which this American fungus has appeared.

The wholesale destruction of the gooseberry crop which the present fungus causes is described in my previous papers in this JOURNAL, where a full and illustrated account of the fungus is given, together with the best means to be employed against the disease.

I propose to give below the most important details in connection with the recent appearance of the disease in foreign European countries, and the manner in which the disease is being combated in certain countries. Before doing so, however, I will mention the present distribution of the disease in Ireland. In 1904, in the paper mentioned above, I recorded the occurrence of the fungus in nine localities in six counties. From information which I have since received it is clear that the disease has increased its area to a considerable extent. The following notes come from the various affected localities.

Queen's Co.: Abbeylax. — A correspondent writes: "The disease was bad again with me this year (1905), and I have now burnt *all* my bushes, and do not mean to have any again in my garden for two years. I also saw the mildew in a garden half a mile from my own, and it was very bad there. I heard of it, too, in Co. Carlow."

Co. Antrim. — A correspondent wrote from Antrim in October 1904: "The American gooseberry-mildew has increased very much with me. I

have not used any fungicide, for so far as I can learn those recommended are of no use, besides rendering the undamaged portion of the crop practically useless for market purposes. The mildew does not affect the crop or trees to the extent one was led to suppose it would. I find many of the gooseberries attacked seem to recover and ripen, and bear only small scars on their surface as a mark of the disease having been present in their earlier stages." Another correspondent wrote from Killagan, in November 1904: "I may say that the bushes and berries are not so badly affected this year as in the previous years. This may be due to the fact that I have sprayed for the past three years with liver of sulphur (potassium sulphide), one ounce to two gallons of water, and apply it several times during the season. I destroyed the bushes on which the mildew first appeared, and which were very badly attacked. In my case the 'Yellow Amber' variety seems to suffer most . . . I am glad to say that the disease was very slight on my bushes this past season (1905). As usual, I sprayed the bushes several times during the early part of the season with the potassium sulphide spray you recommended. I have no hesitation in saying that to this fungicide, and also to the fact of my destroying (several years ago) the worst affected bushes, my success in almost suppressing the disease is to be attributed. There are several qualities of potassium sulphide sold, and it behoves those who intend using this fungicide to see that they procure the very best quality. Some of the cheaper qualities are not so effective." From Ballymena the following report was sent: "The disease is increasing; throughout four plots not a bush is free from it. I know of its occurrence in another large garden near here." Another correspondent writes: "I fear the disease is spreading. I saw it last year in more than one place in Co. Meath, and I have also heard of it from Co. Louth."

Co. Dublin: Foxrock.—A correspondent wrote in November 1904: "I am sorry to say that my gooseberries suffered again this year to some extent from the mildew, though perhaps not so much as last year. I sprayed twice with the potassium sulphide spray you recommended, but I think the first spraying was rather late. I had about a dozen to twenty trees affected, though I sprayed them twice during the spring, but the amount of mildew was less than last year. I have now destroyed all the trees which were badly affected, and hope by spraying again next spring to get rid entirely of the disease."

Co. Westmeath.—The following notes were sent by a correspondent in 1904 and 1905 respectively: "I used the fungicide recommended by you (one ounce of potassium sulphide to two gallons of water) three times in the spring, just before and after the breaking into leaf of the gooseberries, with the result that there was a marked diminution of affected berries and shoots as compared with last year. . . . The mildew was very slight in my garden this year, and the preventive measures you advised appear to have had an excellent effect. In a garden about three miles from here, which has been neglected for the past few years, it was very bad."

Co. Down.—A correspondent writes from Newtownards: "On making inquiry round my neighbourhood, I find the disease is very prevalent this year (1905), some growers having every bush affected, and the fruit rendered quite unsaleable."

Mr. Thomas Scott, Horticultural Instructor to the Down County Committee of Agricultural and Technical Instruction, has kindly furnished me with the following notes: "I am sorry to say from what I can learn that the disease is spreading rapidly in this county, and there is no doubt whatever that it is on the increase. While its area has undoubtedly increased, its attacks in some cases this year (1905) were not so severe as in last season; this I attribute to the past very dry summer. In answer to your question as to whether the fungus has attacked red currants, I may say that no case has come under my notice, although I have seen the disease in numerous gardens in some six centres in the county. I may mention, however, that a few days ago a lady, who knows the disease well, told me she had it upon her currants this year. I hardly think she would have been misled in the matter." Writing later, Mr. Scott reported: "In the district of Killeagh I found the fungus in nine gardens. The disease appeared also at Rademon, about six miles distant, last year, and this year it had increased. In all, I have discovered it in six districts of this county during the past year. In 1908 I discovered it in two gardens in Co. Wexford; these were at least twenty-five miles apart. I could not trace any cause for its appearance there; fresh bushes had not been planted. . . . I have personally observed the disease in six districts and in sixteen gardens."

Co. Meath.—Examples of diseased berries and young wood have been sent to me from Tara. The varieties affected were 'Whinham's Industry,' 'Crown Bob,' and 'Greengage.'

Co. Cavan.—A correspondent writes from Virginia: "The outbreak of the gooseberry-mildew was on a small farm in this county. In the absence of State control, we are not authorised to compel destruction of diseased plants. In the case of foul brood in bees, compensation is given. I endeavoured to see if the Department of Agriculture could provide this in the case of the present gooseberry disease, but there is no fund available."

It seems clear from the above reports that the disease is steadily on the increase in Ireland. In the few cases where the fungicide recommended (potassium sulphide) has been employed, the fungus has been kept from spreading. In the absence of any organised attempt to eradicate the disease, however, there is every reason to fear that it is gaining a permanent foothold in Ireland, and that the fungus will continue to spread from county to county—as it has done since its first appearance in 1900—until the gooseberry crop over the whole of Ireland will be exposed to this dangerous disease. I give on p. 181 an outline map showing the areas at present known to be affected by the American gooseberry-mildew. If this is compared with the map I gave on p. 108 of vol. xxix. of the R.H.S. JOURNAL, it will be seen that three new counties, Cavan, Meath, and Wexford (the last extending the southern limit of the fungus), have now been added to the list of affected counties. The disease has now been observed in so many places in Co. Down—it occurs in at least twenty gardens in seven districts—that it seems probable that it is generally prevalent throughout this county; to indicate this, I have shaded the whole county in the map given above.

If the present conditions are allowed to continue, it is practically

certain that the appearance of the disease in England is merely a matter of time.

As regards the outbreaks of the disease on the Continent, the following facts are to hand :

Russia.—Professor Bucholtz wrote to me in July 1904: "This year all the gooseberries in the neighbourhood of Riga have been attacked and destroyed by the fungus." Professor A. de Jacewski, at the Seventh International Congress of Agriculture at Rome in 1903, read a paper in which evidence was brought forward virtually establishing the introduction of the fungus into Russia on diseased gooseberry bushes imported by nurserymen from America.

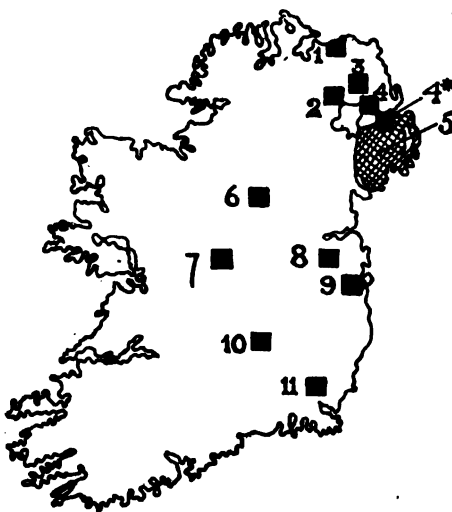


FIG. 35.—OUTLINE MAP OF IRELAND, SHOWING THE AREAS AFFECTED BY THE AMERICAN GOOSEBERRY-MILDEW.

1. Coleraine, Co. Derry; 2. Castledown, Co. Derry; 3. Ballymena, Co. Antrim; 4. Antrim, Co. Antrim; 4*. Killagan, Co. Antrim; 5. Co. Down; 6. Co. Cavan; 7. Athlone, Co. Westmeath; 8. Tara, Co. Meath; 9. Foxrock, Co. Dublin; 10. Abbeyleix, Queen's Co.; 11. Co. Wexford. Also reported from Lissanoure and Broghahan, Co. Antrim; Aghadoey, Co. Derry; Co. Louth and Co. Carlow.

Germany.—Professor Aderhold recorded in July 1905, for the first time in Germany, the appearance of the disease at Labischin, near Bromberg (Posen). The disease is believed to have been introduced in this case from Russia. The entire loss of the gooseberry crop resulted in some instances. A fully illustrated leaflet describing the disease, and recommending the destruction by burning of affected bushes, is being circulated through Germany.

Poland.—Chelchowski reported in 1902 the occurrence of the disease for the first time in Poland, in the governments of Lomza and Siedlce. By 1905 the disease had spread to the governments of Curland, Kowno, Wilna, Volhynia, and Podolia.

Denmark.—In 1904 Rostrup reported the occurrence of the disease for the first time in Denmark, from two localities—Tikøb-Egnen and Starnholt. In both instances where the outbreak occurred the bushes

had been obtained from the same nursery. Practically, not a single berry remained free from the disease. The disease is now known from nine localities in Denmark.

Sweden and Norway.—The disease has been discovered in two localities, Karlshamn (Sandvik) and Falsterbo, in Sweden, and in one locality (Langesund) in West Norway. The disease had been introduced with gooseberry plants imported from a nursery at Korsör, Denmark, in 1900. Prompt and energetic legislative measures to combat the disease have at once been taken by the Swedish Government.

Finland.—The disease was first discovered in a few localities in 1904 ; it has since been found to be somewhat widely distributed through Finland. The fungus was introduced on diseased gooseberry bushes imported from Russia. The Government have now adopted the same legislative measures as those employed in Sweden—viz. the temporary prohibition of the importation of gooseberry bushes and gooseberries, the inspection of nurseries, with control over plants supplied from them, and the destruction (with compensation), or spraying, of affected stock.

Austria.—Professor Aderhold has recently reported the occurrence of the disease at Pinzgau (Salzburg).

II.—THE NEED FOR LEGISLATION.

In October 1905 I published in the "Gardeners' Chronicle" an article "On the Present Danger threatening Gooseberry-growers in England." I wrote as follows : "I would point out that gooseberry-growers in England may best realise the danger threatening them by visiting a hop-garden overrun by the hop-mildew, or a rose-garden where there is an epidemic of mildew. The American gooseberry-mildew is a species * very closely related to the hop- and rose-mildews, and would flourish no less vigorously than do these in the English climate. Where it has occurred in Ireland, it has often caused the wholesale destruction of the gooseberry crop. It is not too much to say that if once it is allowed to gain a foothold in the gooseberry-growing districts of England it will never be completely expelled.

"So long as the disease is allowed to flourish in Ireland, it menaces the English grower. English gooseberry-growers should demand from the Authorities the prohibition of uncontrolled importation of gooseberries into England or Ireland, and they should demand further that every means be taken to stamp out the disease in Ireland. It has already been ascertained that the mildew has been introduced into Ireland by diseased stock imported into nurseries from America ; further action in the matter lies beyond the power of the individual, and must be undertaken by the Government, possibly with international assistance. Resolutions (on the subject of systematic international work for the combating of plant-diseases) have already been passed by the Vegetable Pathological Section at the International Agricultural Congresses, and these should form the basis for international procedure.

* I have given a full description of the fungus (with figures), together with an account of its methods of attack and the preventive measures to be taken, in vol. xxv. of the R.H.S. JOURNAL, and in succeeding volumes.

"In those countries in which the Government most fully recognise the economic importance of vegetable pathology, as in the United States, New Zealand, and Sweden, the adoption of precautionary measures for the avoidance of fungus diseases has been enforced by legislation. In such countries the passing of Acts framed to prevent the introduction into the country of certain plant-diseases has safeguarded the interests of the agriculturist and horticulturist in the same way as those of the animal-breeder have for a long time been protected by the various Acts prohibiting imports of diseased or suspected animals."

In the "Gardeners' Chronicle" in December 1905 the following statement was made in connection with the present gooseberry disease: "The point is, was the fungus (1) introduced on living plants in its fully developed, conspicuous condition, in which case it could not have escaped the eye of an official on the look-out for diseases; or (2) did it come under the form of spores adhering to the plant which in due season produced the disease? In the latter case, no official, however observant, could have detected its presence. To say that, if legislation on the point had been in force, the disease would not have entered Ireland, is only the expression of an enthusiast, and will not bear criticism."

This contains a serious misstatement, which I have already corrected in an article on the subject of "Legislation with respect to Plant Diseases caused by Fungi." * It will be well to re-state here what I said on this point: "If legislation, such as that employed against this disease by other countries at the present time, had been in force, the disease would almost certainly have been prevented from entering Ireland. That stage of the fungus—viz. the stage in which the fungus is carried about by naked spores adhering to the plant, assumed above (2)—*does not, as a matter of fact, occur in the life-history of the fungus.* In the whole group of these mildews, the resting-spores are enclosed in conspicuous fruit-bodies throughout the winter, and are not to be found as isolated spores † adhering to plants; only in spring at the moment of infection are the resting-spores of the fungus liberated.

"Further, in the case of the present disease, the fungus is distinguished by possessing persistent, superficial, brown mycelial patches, in which the fruit-bodies enclosing the winter-spores are embedded. These brown patches of mycelium are superficial on the young wood, and, being conspicuous, the disease can easily be detected.

"Hence the assumption that no official could detect the disease on imported stock is quite unfounded."

In order to set forth the exact state of affairs, it will be well to make the following quotation from the same article: "The disease was first observed in 1900, in a garden in Ireland; by 1904 it was established in nine localities in six counties. In spite of repeated warnings, which I gave in several papers published in 1900–1905, dealing with this dangerous disease, no systematic attempt has yet been made by the Authorities to stamp out the disease in Ireland, or to prevent further importation of diseased gooseberry bushes.

* *Gardeners' Chronicle*, January 27 and February 3, 1906.

† The introduction of the fungus by means of the summer spores, or *conidia*, is quite out of the question.

"At the present time the disease still flourishes in the very same garden in which it was observed in 1900.

"Let us remember that the danger in connection with this disease which now confronts European gooseberry-growers is no problematical one. The disease has proved year after year in the United States, and in Europe every year since its introduction, to be a most devastating one. In my previous articles, the extracts I have given from a number of Bulletins of various American Agricultural Experiment Stations, also from the reports of the Commissioners of Agriculture, show that the mildew is the one great enemy of the gooseberry in the United States. In the 'Year-book of the Department of Agriculture' (United States) for 1899, in an article on 'Progress of Plant-breeding,' an account is given of how the American gooseberry-growers were forced to give up the cultivation of the European gooseberry on account of its susceptibility to mildew, and have had to depend upon raising improved strains of native American species, which are much less susceptible to the disease.

"We shall obtain no clear view as to what could be effected by legislation if we confuse together diseases which are practically cosmopolitan with those which appear first as epidemic diseases confined to definite areas. It is the stamping out of diseases of the latter class, and the prevention of their introduction or re-introduction, which lie within the province of legislation.

"In conclusion, with reference again to the question of dealing with the American gooseberry-mildew—at the present moment a vital and pressing question—I cannot help expressing my regret that statements calculated to dissuade the Authorities from employing legislative measures to stamp out this disease should have been published. It is the more regrettable since at the present time there is a movement on the Continent to establish an International Bureau of Plant Pathology, in connection with an International Institute of Agriculture.* If our Government will support this movement, we may hope that at length the question of legislation and the control of plant diseases will receive the careful and scientific attention it has received in other countries."

An eminent mycologist has said that "there is not a scrap of direct evidence" on the introduction of the gooseberry-mildew into Ireland. But I would repeat what I distinctly stated in the "Gardeners' Chronicle," that I had received information from a private source that "it has been ascertained that the mildew has been introduced into Ireland by diseased stock imported into nurseries from America." The same authority has written: "It is directly opposed to common experience, also to careful investigation, to conclude that diseased plants are sent cut by nursery-men." The incorrectness of this general statement is now evident from the information supplied by Professor J. Eriksson's article on the American gooseberry-mildew on p. 188 in the present volume of this JOURNAL, where we learn that the disease has been brought to Sweden on plants supplied from a certain nursery at Korsör in Denmark.† In numerous

* See my article in *Gard. Chron.*, October 1905; also *Fortnightly Review* for November 1905.

† We find the following in Eriksson's recent article (12, p. 187): "Professor Rostrup wrote to me: 'In all the Danish localities, as well as in the Norwegian one, the disease

other cases where the disease has suddenly appeared in European countries, it has been traced to nurseries known to import gooseberries directly or indirectly from America.

It is necessary to draw special attention to the misstatements that have lately been made in connection with the American gooseberry-mildew, in order that the main issues may not be obscured, viz. the fact that the present dangerous gooseberry disease is one recently introduced through importation of affected stock, and that the disease is eminently a case where legislative action by the Authorities is required.

I have obtained from the Customs the following statement of the quantities and values of raw gooseberries imported into this country in 1902-1904. Particulars of the importation of gooseberry-bushes are not available, as the law does not require such goods to be described separately by importers.

Countries whence imported	1902		1903		1904	
	cwts.	£	cwts.	£	cwts.	£
Norway	22	18	—	—	—	—
Denmark	1	1	39	40	—	—
Germany	860	216	2,068	1,704	208	156
Netherlands	23,886	13,728	28,594	22,640	33,122	18,024
Belgium	1,941	1,288	1,416	1,200	1,776	1,098
France	1,354	1,668	2,138	2,780	1,091	1,709
Channel Islands	—	—	57	80	23	37

We may welcome the fact that attempts are now being made in different quarters to direct public attention to the imperative necessity of invoking legislation. The danger of the present state of affairs and the importance of taking steps to prevent the ever-increasing importation of animal pests of plants is emphasised in Professor Theobald's recent Presidential Address before the Association of Economic Biologists.* Not the least important of the recommendations contained in the Report of the Committee on the Fruit Industry (published in the R.H.S. JOURNAL, vol. xxix. p. 556) is the one urging the Authorities to deal energetically with the question of the importation of fungus and insect diseases affecting plants.

But, in connection with the American gooseberry-mildew, I would point out here emphatically that the opportunity of stamping out the disease in Ireland is fast slipping away. Further importation of diseased plants can of course always be prevented by legislation, but (as I wrote in 1905) the possibility of the complete eradication of the disease in Ireland diminishes as each year passes, bringing with it the

has been distributed from one and the same nursery in Denmark. I did not feel myself justified in giving this information to the public, although I mentioned it to the Authorities. The owner of the nursery, at my advice, adopted the strongest possible measures, grubbing up and burning all his gooseberry-bushes, and at the same time promised not to cultivate gooseberry-bushes for some years.' And what has been the result of the leniency and indulgence shown to this firm? The firm, whose name has been given to me privately, has offered for sale in its catalogues for the past five years (1901-6) respectively 30, 21, 27, 31, and 28 different varieties of gooseberries. Is it surprising under such circumstances that the disease has spread in Denmark so quickly and with such intensity?"

* "Animal Pests and Legislation" (*Proc. Assoc. Econ. Biolog.*, vol. i. p. 29, 1906).

establishment of the mildew in fresh localities. Already the list of affected areas has grown dangerously long, and the Agricultural Authorities will incur a grave responsibility if they neglect to take prompt and energetic measures to stamp out the disease.

Other Governments, on the outbreak of this very disease in their countries, have at once adopted legislative measures to stamp it out. An admirable instance of prompt action is supplied by the Swedish Agricultural Authorities. In 1905 the disease was first discovered in Sweden in one garden; the same year legislative measures were put in force temporarily forbidding the importation of foreign gooseberry-plants and gooseberries, and enforcing the carrying out of strict preventive measures against the disease.* In 1900 the disease was first discovered in Europe in one garden in Ireland; nothing has been done; at the present time (1906) the disease still flourishes in the same garden in which it was discovered, and has now become widespread over a large part of Ireland.

How much longer will British fruit-growers be content that nothing should be done to stop the increase of the disease? At present the chief danger to the English gooseberry-grower lies in the possibility of a further importation of diseased gooseberry-plants, and in the continued spread of the disease in Ireland, until by some means the fungus is conveyed to England. I would suggest that some such body as the National Fruit Growers' Federation should take the matter up, and not rest until the Authorities are persuaded to give this country that legislative protection against fungus diseases which other countries—and even our Colonies—enjoy.

LIST OF PAPERS RECORDING THE APPEARANCE IN EUROPE OF THE AMERICAN
GOOSEBERRY-MILDEW, AND THE MEASURES TAKEN AGAINST IT.

1. SALMON, E. S.: The Gooseberry-mildew (*Sphaerotheca mors-uvæ* (Schwein.), Berk.) (JOURNAL R.H.S. xxv. 139–142, f. 37, 1900).
2. *Idem*: The American Gooseberry-mildew in Ireland (*l.c.* xxvi. 778–779, 1902).
3. *Idem*: On the Increase in Europe of the American Gooseberry-mildew (*l.c.* xxvii. 596–601, f. 166, 1902).
4. *Idem*: On the Present Aspect of the Epidemic of the American Gooseberry-mildew in Europe (*l.c.* xxix. 102–110, f. 23, 1904).
5. *Idem*: The Present Danger threatening Gooseberry Growers in England (Gardeners' Chron., October 28, 1905).
6. *Idem*: Legislation with Respect to Plant Diseases caused by Fungi (*l.c.* January 27 and February 3, 1906).
7. JACZEWSKI, A. DE: La Maladie des Groseillers épineux en Russie (VII^e Congrès Internat. d'Agric. Rome, 1903) (Rome, 1904, vol. ii. 442).
8. ERIKSSON, J.: Den Amerikanska Krusbärsmjöldaggen på Svensk mark (Meddel. K. Landbruks Akad. Experimentalfält. No. 87, Stockholm, 1905).
9. *Idem*: Ist es wohlbedacht, den Beginn einer planmässigen internationalen Arbeit zum Kampfe gegen die Pflanzenkrankheiten noch immer aufzuschieben? (Stockholm, 1905).
10. *Idem*: Den Amerikanska Krusbärsmjöldaggen inför Kgl. Majestät (Trädgården, 1906, 13–16, Stockholm).
11. *Idem*: In Botan. Centralb. xcix. 566, 1905.

* The practical details of the scheme adopted are described in Professor J. Eriksson's article on the subject at p. 139 of this volume.

12. *Idem*: Der amerikanische Stachelbeermehltau in Europa, seine jetzige Verbreitung und der Kampf gegen ihn (Zeitschr. f. Pflanzenkrankh., xvi. 83, 1906).

13. CHELCHOWSKI, S.: *Rosa maczna agrestia (Sphaerotheca mors-uvæ)* Warechswiat, Warschau, 1905, Nr. 29, p. 452; Nr. 39, p. 622 (see Botan. Centralbl. 1905, pp. 486, 566).

14. ADERHOLD, R.: Der amerikanische Mehltau des Stachelbeerstrauches, eine für Deutschland neue Pflanzenkrankheit (Kaiserl. Biolog. Anst. für Land- u. Forstwirtschaft, Flugblatt Nr. 35, 1905).

15. ROSTRUP, E.: En farlig Stikkelsbaersygdом indført i Danmark [A dangerous Gooseberry disease introduced into Denmark], (*Haven*, iv. 165-166, 1904).

16. Den Amerikanska Kusbärsmjöldaggen (Flygblad från Landbruksstyrelsen, February 1906, Helsingfors).

17. HENNINGS, P.: Ueber die Verbreitung und das Vorkommen von *Sphaerotheca mors-uvæ* (Schw.), dem Stachelbeermeltau, in Russland (Gartenflora, li. 170, April 1, 1902).

18. *Idem*: Weitere Mitteilungen (l.c. 399, August, 1902).

19. MAGNUS, P.: Ueber den Stachelbeer-Meltau (l.c. 245, May 1, 1902).

20. MAURER, L.: Der amerikanische Meltau des Stachelbeerstrauches (Deutsche Obstbauzeitung, p. 34. Stuttgart, 1906).

THE MEANS EMPLOYED TO COMBAT THE AMERICAN GOOSEBERRY-MILDEW IN SWEDEN.

By JAKOB ERIKSSON, Ph.D., Professor at the Royal Academy of
Agriculture, Experiment Station, Stockholm.

ON account of the discovery of the American gooseberry-mildew in Sweden in the summer of 1905, I sent on July 31 of that year the following report to the Minister of Agriculture in Sweden :—

“For more than half a century a serious disease appearing on cultivated gooseberries, viz. the American gooseberry-mildew, *Sphaerotheca mors-uvæ* (Schwein.), Berk., has caused great destruction over a very large area in the North-American continent. This disease has determined the course adopted in the culture of the American gooseberry, and has made it impossible in America to cultivate the best varieties of European gooseberries, since they have proved to be more susceptible to the attacks of the mildew than the American species. As a consequence of this the American fruit-growers have been driven to the necessity of raising varieties from wild species of *Ribes* native in America (*R. oxycanthoides* and *R. cynosbati*); these varieties, while certainly of considerable value, have never reached the same perfection as the best European gooseberries, all of which are varieties of *Ribes Grossularia*.

“Will the European culture of the gooseberry be able to maintain in the future the high position which it has hitherto occupied? We have good reason to ask this question, now that it is known that the American gooseberry-mildew has at length appeared in Europe. The first appearance of the disease in Europe was reported in the year 1900 from the North of Ireland, where it was noticed at that time in three gardens. Since that date, each year that has passed has seen the establishment of the mildew in fresh localities. Up to the beginning of the present year, the disease had been reported from eleven localities in Ireland. In 1901 the fungus made its appearance in Russia, viz. in the government of Moscow; the very next year it appeared in six fresh localities in the Russian Empire. Now the disease is reported from widely separated places in Russia. From facts which have lately been discovered, it appears that in 1900 and 1901 the gooseberry-mildew may have immigrated also into Denmark and Sweden. At the end of last year it was known that the disease had appeared in seven localities in Denmark, and this year the fungus was found to be present at one place in Blekinge in Sweden (where it was first noticed in 1901), and at one locality in West Norway.

“The almost simultaneous appearance of the disease in widely separated localities in different European countries, as well as the rapid spread of the disease wherever it has become naturalised, remind one naturally of the earlier immigration of the potato-fungus (*Phytophthora infestans*, De By.), and the vine-mildew (*Oidium Tuckeri*, Berk.), in the middle of the forties. These species of fungi, since their appearance, have never

ceased to carry on their destructive work. The historical examples cited above call upon us to pay special attention to this new invader, and to take strenuous measures against it.

"At the commencement of the outbreak it was rather difficult to ascertain in what manner the disease came into Ireland as well as into Russia. It was at first supposed to be native in both lands, though not before noticed there. At that time no one was aware of any importation of gooseberries or gooseberry-plants from America. In the year 1902 it became known, however, that two firms of florists in Ireland had, as a matter of fact, some years previously imported gooseberry-plants from the United States. The same year it was discovered further that fruit-growers in Riga, Kaluga, and Tambor, in Russia, had imported gooseberry-plants from America. The disease was brought to Blekinge in Sweden with plants which came from Mathiesen's nurseries in Denmark (Korsör) in the summer of 1900.

"On account of the immigration of the gooseberry-pest into our country, the Royal Swedish Academy of Agriculture has at once circulated through the kingdom a leaflet, in which the notice of the public is directed to the new enemy, and the necessary instructions are given for dealing with it.

"The following measures were proposed in that leaflet:—

"(1) The public should not be allowed to buy gooseberry-plants except from nurseries the owners of which hold a written statement, issued by a scientific specialist or by a District-gardener, certifying that the disease does not exist in the nurseries in question, and that all plants offered for sale have been cultivated in these nurseries for a sufficient length of time—at least two years—to enable one to judge their state of health.

"(2) If the disease has already gained a footing in a garden, all severely diseased bushes ought to be rooted up and burnt, with their berries; this practice should be carried out as early in the summer as possible, since the spread of the disease takes place principally in the early summer. Where the bushes have grown, the earth ought to be broken up and sprayed with potassium sulphide (80 grams of potassium sulphide to 10 litres of water).

"(3) If the bushes have been only slightly attacked by the disease, the shoots of the current year, on which brown mycelial patches with embedded fruit-bodies are to be seen, should be cut away and burnt towards the end of the autumn. The following spring, just before the buds open, the plants ought to be sprayed with the same solution of potassium sulphide; this spraying must be repeated every eighth to fourteenth day, especially after heavy rains, until the berries are half-grown.

"However, it seems to me that we may very well ask whether, besides the measures described above, additional steps ought not to be taken by the Government in order to check the spread of this new disease in the country. Therefore, I venture to address to you, Sir, the following proposition. Taking into consideration the fact that the gooseberry is the most important of our cultivated bush-fruits, and recognising that a serious disease attacking this plant must result in a considerable national

loss, I think there is good reason why we should endeavour with the co-operation of the Government to extirpate completely, if possible, the disease from the gardens in our country where it has already appeared. To secure this end, I consider it necessary that steps should be taken to stop the spread of the disease into other localities ; a careful investigation should be made of all the nurseries of our country from which gooseberry-plants are sold, and the importation of foreign gooseberry-plants and gooseberries should be prohibited.

"The taking of such action by the State at the present time, before the disease has become established to any considerable extent (up to the present time we know of only one infected locality), would certainly be the most effective safeguard available against the disease.

"In view of the above considerations, therefore, I take the liberty of proposing respectfully that you, Sir, would be pleased to recommend the carrying out of the following regulations :—

"That in the gardens (nurseries) where the American gooseberry-mildew occurs, all diseased bushes shall be rooted up and burnt under the supervision of a District-gardener ; and as compensation for the contingent loss to the various private owners, the State shall pay to these persons a sum equal to one half the value of the plants destroyed ; that value to be fixed by the District-gardener.

"The District-gardeners shall be ordered to make an inspection, each in his own district, of the different nurseries, and if a nursery-garden is found to contain affected stock, the fact must be immediately reported to the Royal Swedish Academy of Agriculture, Stockholm, and the District-gardener must also undertake the destruction of the diseased plants.

"Further, the Government shall decree a temporary prohibition against the importation of foreign * gooseberry-plants and gooseberries."

On the same day, July 31, that this communication was sent in to the Department of Agriculture, it was submitted to the Royal Administration of Agriculture for the purpose of obtaining an opinion on the proposed prohibition against the importation of foreign gooseberry-plants and gooseberries. The reply made by the Administration on September 8, after referring to the reasons put forward in the propositions, recommends the intervention of the State, and submits the following proposals to the Government :—

"To decree a temporary prohibition against the importation into the country of foreign gooseberry-plants and gooseberries. To authorise the Administration to empower the Agricultural Societies—acting through their District-gardeners or in other ways, and using such means as the Administration thinks proper—to take steps to prevent and suppress the American gooseberry-mildew within the gardens of the country. To assign a sum of 8,000 crowns for use in connection with the proposals mentioned above. To authorise the Academy of Agriculture to circulate among the public, with the assistance of the Agricultural Societies, the leaflet mentioned above. To order each Agricultural Society to report to the Academy and the Administration, as soon as possible, whether the disease occurs within the district of the

* To include Norway.

society, and if it appears later to notify the fact without delay ; also, in the cases where it has appeared, to make a report before the end of each year on the occurrence of the fungus and the measures employed for combating it."

The matter was next submitted to the Board of Customs, in order to obtain its opinion on the subject. In the report which the Board sent to the Government, it is stated that the Board does not find any objection to make against the decreeing of a temporary prohibition against the importation of foreign gooseberry-plants and gooseberries.

The Royal Proclamation concerning a temporary prohibition against the importation into the country of foreign gooseberry-plants and gooseberries was given at the Palace of Stockholm on September 22, 1905, and runs as follows:—" We, Oscar, &c., make known : that we, on account of the motion which has been made concerning the taking of measures in order to prevent the spread within the country of the American gooseberry-mildew, *Sphaerotheca mors-uvæ* (Schwein.), Berk., after the hearing of the authorities concerned, have thought prudent to recommend a *temporary prohibition against the importation into the country of gooseberry-plants and gooseberries*. This Proclamation comes immediately into force . . . "

One might have hoped that, after the strong measures which have been taken in Sweden, the gooseberry-growers of this country would now be completely safeguarded against the dangerous enemy. Unfortunately, however, there are some reasons to doubt this. The following fact must carefully be borne in mind. Several weeks passed between the first discovery of the disease in the country and the decree of the Royal prohibition against the importation of plants and berries. During these weeks, as well as before, both in 1904 and 1905, the introduction and the spread of foreign gooseberry-plants into Sweden might have taken place freely, and to some extent it certainly has taken place. One establishment in Gothenburg, for instance, states in a recently published catalogue that during the year 1905 more than 5,000 gooseberry-plants of the varieties 'Whinham's Industry,' 'Whitesmith,' &c., have been sold by them in this country, and that these plants had been imported from Scotland. It is then essential to take into consideration the fact of the possibility that through imports made during 1905, and perhaps even during 1904, new centres of infection may have arisen at various places in this country, and that such fresh affected areas cannot be discovered before the spring and summer of 1906 or 1907, when the new plants will show fresh growth and produce fruits.

In order to make the measures undertaken to eradicate the disease as effective as possible, the Swedish Administration of Agriculture intends to send during the spring (*i.e.* February or March) of 1906 and 1907 official letters to the Agricultural Societies in the different parts of the country, asking these societies to direct, as energetically as possible, the attention of all those growers who have in recent years (especially in 1905) planted gooseberry-plants of foreign origin to the possibility of the present disease appearing in the new plantations, and to undertake, if the fungus is discovered, prompt and energetic measures to eradicate the disease.

STOCKHOLM, February 12, 1906.

ON A FUNGUS DISEASE OF THE CHERRY LAUREL
(*Prunus Laurocerasus*, Linn.).*

By ERNEST S. SALMON, F.L.S., Hon. F.R.H.S., South-Eastern
Agricultural College, Wye, Kent.

IN July 1905 my attention was directed to a fungus disease affecting a shrubbery in Kew Gardens formed of the cherry laurel (*Prunus Laurocerasus*, Linn.). The fungus causing the disease was a white mildew, the patches of which covered the leaves of the young shoots. Occasionally, patches of mildew were to be seen on the young stems, near the ends of the shoots; the older leaves of all the plants remained entirely free from the disease. On microscopical examination, the fungus was found to be an *Oidium*; that is, the conidial stage of some species of the family of powdery mildews known as the *Erysiphaceæ*. The appearance of the fungus, under a magnification of 400 diameters, is shown in fig. 86. The thin cobweb-like mycelium of the fungus was composed of interwoven, white, branched, septate hyphæ, spread over the epidermis of the leaf. Each hypha sent, at short intervals, large, roundish haustoria (*h*) into the epidermal cells. It was by means of these haustoria that the mildew was maintaining its parasitic life, and absorbing the whole of its food from the cells of its host-plant. From the hyphæ, tall conidiophores, often closely packed together, arose, each bearing a long moniliform chain of conidia (*a*). Each mature conidium is oblong in shape, with rounded ends, and measures $23-28 \times 12-15 \mu$.† Minute bodies of a definite shape (flattened discs, or cylindrical, or conical and hollow) occur inside each conidium. The bodies are composed of a substance called fibrosin, and are characteristic of the conidia of the species of the genera *Sphaerotheca* and *Podospheera*.

In order to see whether the disease was due wholly to the fungus—in which case the fungus would be able to attack the cherry laurel without any previous injury to the shrub—I took some conidia from the affected plants in Kew Gardens, and inoculated with them some healthy young shoots in a private garden at Reigate, Surrey. On examining them at the end of fourteen days, I found that full infection had resulted, all the inoculated leaves bearing small powdery patches of mildew. All the young shoots of the affected cherry laurel in Kew Gardens were cut off in the usual trimming of the shrubbery in July, and no trace of mildew reappeared during the season. In the case of the shrubbery at Reigate, also, the mildew disappeared as soon as the young shoots grew out.

In the present instance it appeared as though the mildew is capable of attacking the cherry laurel only just at the season when the young

* From the Jodrell Laboratory, Royal Botanic Gardens, Kew.

† Small orange-coloured larvæ, which have been proved to feed exclusively on conidia of the *Erysiphaceæ* (see *Journal of Bot.*, 1904, p. 184), occurred in considerable numbers on the mildewed leaves.

shoots are bearing new leaves. It was noticeable that in all cases the mildew died away as the leaf grew older; in old leaves the places

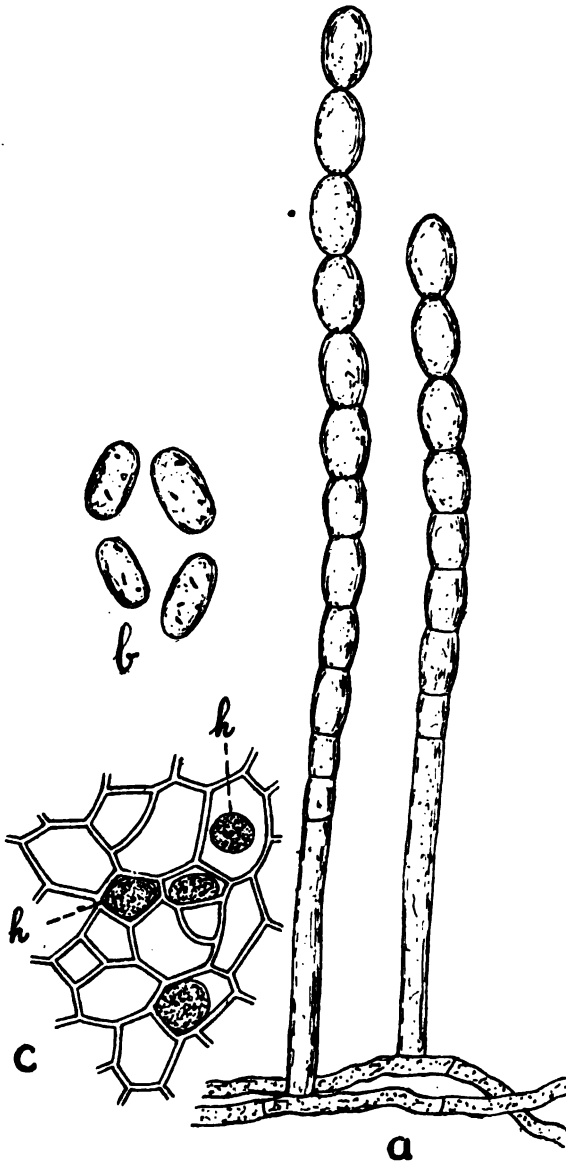


FIG. 36.

- a.* Two conidiophores: one (to right) immature; one (to left) mature, with chain of conidia. *b.* Four isolated ripe conidia, showing the fibrosin bodies. *c.* Portion of a leaf of cherry laurel attacked by the mildew, showing the formation of the haustoria (*h*) in the epidermal cells (the hyphae of the mycelium have been removed). All the figures $\times 400$.

previously attacked (when the leaf was young) could be recognised by the brown patches of periderm which the leaf had formed over the injured

spots. The same was the case with the attacked stems when they grew out. The phenomenon was even more marked in the case of some plants of *P. Laurocerasus* var. *camelliaefolia* in another part of Kew Gardens which became attacked about the same time by the present mildew.

All the appearances suggested that the mildew with which we are now dealing was not fully adapted to living on the plant it was attacking. Instead of merely taxing the leaf-cells, and establishing that peculiar symbiotic connection between parasite and host which is characteristic of the present group of fungi as a whole (3, p. 146), the mildew of *P. Laurocerasus* had caused the death of many of the cells attacked, and stimulated the plant to the production of periderm over the injured places on the leaf and stem.

On looking through the literature on the subject, it was apparent that very little was known about the present disease. It has been recorded twice from the Continent, but in neither case has the exact determination of the fungus been satisfactorily made.

In 1879 Bertolini (1) first mentioned the fungus, which he found growing on the fruits of *P. Laurocerasus*,* in a park near Bologna, Italy, in June 1877, and again in 1878. It was noticed that only the fruits which were growing on the shrubs planted on excessively damp soil, or on branches in deep shade, were attacked by the mildew. In the drier localities close by in the same park the bushes remained unattacked. Bertolini gave a very brief description of the fungus, which he called *Oidium Passerinii*.

In 1880 Roumeguère (2) published an article entitled "Appearance in France of a New Mould, *Oidium Passerinii*, Bert. f., the Conidial Stage of a New *Erysiphe*, *E. Bertolini*." Here an account is given of a mildew which appeared suddenly in July 1880, on the famous cherry laurel shrubberies in the public garden at Tarbes (Hautes-Pyrénées). The mildew spread with great rapidity through the shrubbery, due, it was believed, to certain favourable conditions, viz. the excess of humidity caused by the heavy rains that fell in July and August. "All the leaves, absolutely all, both in the sunlight and in the shade, became covered with large patches of mildew, which also spread over the fruits." The mildew, at the time of its appearance, was identified as Bertolini's *Oidium Passerinii*. On visiting the same shrubberies a month later, Roumeguère found that the *Oidium* had disappeared. On certain leaves, however, a few minute blackish perithecia were discovered; each containing four asci with from five to seven brown spores. This Roumeguère believed to be the perfect, or winter, stage of the fungus. It is almost certain, however, that Roumeguère was in error in connecting this perithecial form with the *Oidium* (4). Dried examples of the conidial stage from the shrubbery at Tarbes were sent out in Roumeguère's *Exsiccati Fung. gall.* No. 963, under the name of *Oidium Lauro-Cerasi*. I have examined the example under this number contained in the Kew Herbarium, and found the fungus to be identical with the mildew which has lately appeared on shrubs of *P. Laurocerasus* in Kew Gardens.

* An error occurs in *Sacc. Syll. Fung.* iv. p. 43, where the fungus is recorded "in foliis *Lauri lusitanice*."

Although no perithecial stage of the fungus occurred on the affected shrubs in Kew Gardens, I believe we are now, on account of the following facts, in a position to determine to what species of the *Erysiphaceae* the present mildew belongs. After the mildew had been growing for some weeks on the young shoots of the cherry laurel, I noticed on a few stems, near the youngest leaves, the formation of small, white, barren mycelial patches composed of interwoven thick-walled hyphæ. Such persistent pannose patches of mycelium are characteristic of the rose-mildew *Sphærotheca pannosa* (Wallr.), Lév. (8). Comparison of the conidia and conidiophores of the rose-mildew on roses with those of the mildew on the cherry laurel further established the identity of the two.

An interesting question suggests itself in connection with the present form of *S. pannosa* on the cherry laurel. Is it that this shrub is susceptible at a certain stage of growth or under certain cultural or climatic conditions to the attacks of the rose-mildew, or is it rather that we have in this case a species of *Sphærotheca* the individuals of which now and again are capable of infecting new hosts? *S. pannosa*, as is well known, is extremely common on wild and cultivated species of roses, and on these plants the fungus forms perithecia freely, at least in some countries. Besides these hosts, it not uncommonly attacks the peach (*Prunus persica*). On this plant, however, it very rarely advances beyond the conidial (*Oidium*) stage.* Very rarely, too, according to Starbäck (6), it is found in the conidial stage on the apricot (*P. armeniaca*), and I have in one case seen the conidial stage on the almond (*P. Amygdalus*).†

It appears, then, that at the present time the rose-mildew (*S. pannosa*), whilst flourishing on species of the genus *Rosa* and proving itself fully adapted to live on these hosts, is capable of attacking occasionally species of the genus *Prunus*—commonly the peach, and very rarely the apricot, the almond, and the cherry laurel.

Should the present disease prove troublesome in the future in shrubberies of cherry laurel, recourse should be had to sulphur as a fungicide. It should be applied either in the form of the dry powder known as "flowers of sulphur," or as potassium sulphide ("liver of sulphur"). The "flowers of sulphur" should be well dusted over the affected leaves, and the application should be made on a still day during sunshine. The potassium sulphide is to be used as a spray, at the rate of 1 oz. to 2 gallons of water, and the application should be made about every ten days until the fungus has disappeared.

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* I have seen the pannose mycelium characteristic of the perithecial stage in one case only out of the many hundreds I have examined.

† This is the example sent out in Roumeguère, *Fung. select. ersicc.* No. 4484, under the name of *Monilia candida* (Wallr.), *Oidium fructigenum* Pers. var. *foliicolum* Westend.

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6. STARBÄCK, K.: Om Parasitsvampar (Sommarkurserna i Uppsala 1895, p. 18, 1895).

THE IMPORTANCE OF SELECTING SEED IN PRACTICAL FORESTRY.

By Professor G. F. SCOTT-ELLIOT, M.A., B.Sc., &c.

It is not very common to find those who are actually engaged in forestry paying much attention to the source from which their seed is derived.

A most interesting and instructive series of experiments has been carried out by Professor Adolf Engler in Zurich in this connection.

He obtained seeds of *Picea*, *Pinus*, *Sycamore* and *Larch* from trees growing at different altitudes, and then sowed all these seeds in some twenty-two experimental gardens, which also were at different altitudes, ranging from 500 or 600 metres to 2,000 metres (1,500 to 6,000 feet). The paper in which these experiments are detailed bears every mark of the very greatest care. There are numerous tables and also photographs showing the differences of growth of seedlings of different origin when developing side by side.*

The subject may be a little novel to English readers, for amongst the authors cited by him there is only one English paper! That is by Grigor and Forres in the "Gardeners' Chronicle" of 1865! Moreover, the French and German papers quoted are almost all practically inaccessible to English readers. I do not think some of them can be seen anywhere except possibly in the Royal Society's library. Therefore a somewhat detailed account of these researches may be of interest.

The question is not new, for important experiments have already been carried out.

Louis Vilmorin † cultivated at Les Barres (Département Loiret) Scotch Fir from French, Scotch, German, and Russian (Riga) seed. He found that the Riga Firs were particularly remarkable for their beautiful, straight boles, and scanty branching. They indeed surpassed all other kinds. The second generation at Les Barres from the seed of these Riga Firs possessed the same excellent properties. Grigor and Forres (v.s.) made experiments with Scotch and Continental *Pinus sylvestris*. Tur ski ‡ experimented with seeds both from Tver in Russia and from Darmstadt. Dr. Cieslar tried the same sort of experiments with plants of *Picea excelsa* (from 1 to 3 years old), of *Pinus sylvestris* (1 to 12 years old), and of *Larch* (1 to 12 years old); he compared the seedlings raised from seed obtained in Sweden, Finland, and the Austrian Alps and from trees grown at different altitudes. He found that the power of growth is inherited from the mother tree in the cases of both *Picea excelsa* and *Pinus sylvestris*. The seeds from low elevations furnished quicker growing trees. The seedlings

* *Mittheilungen der Schweizerischen Central-Anstalten für das forstliche Versuchswesen*, Band viii., 2e. Heft, 1905.

† *Mémoires d'Agriculture*, Paris, 1862, p. 332. Also *Administration des Forêts : Catalogue des végétaux, etc., sur le domaine forestier des Barres Vilmorin*, Paris, 1878.

‡ *Allgemeine Forst- und Jagdzeitung*, 1880, p. 57.

from northern Pines at Mariabrunn (his station) remained behind those from the middle European trees.*

M. v. Sivers found that in the Baltic provinces the seedlings of Baltic *Pinus sylvestris* grew into finer-stemmed trees than those which sprang from Darmstadt seed.†

Dr. H. Mayr‡ found that Norwegian and Finland Scotch Fir (*P. sylvestris*) were able to resist the severe climate of their homes better than either Riga or Darmstadt seedlings.

Dr. P. Scholt§ on the strength of many experiments, decides that the local race of Scotch Fir is probably the best suited to its own climate. That is clearly the obvious logical deduction from all the preceding experiments. It is fully borne out by those conducted by Professor Engler.

Perhaps the most lucid and instructive detail which appears from the latter's numerous experiments is this : Seedlings from very high altitudes on the mountains begin their growth in spring a little before, and shed their leaves a very long time before, seedlings of trees in lower altitudes. It, of course, follows from this that at low altitudes the offspring of lowland trees have a very much longer time to grow, and are much taller and more vigorous than their neighbours whose parents dwell high up in the mountains.

Thus from the tables we find the following details, which are illustrated by photographs and diagrams in the original paper :

When *Picea excelsa* was planted at the Adlisberg (670 metres or 2,200 feet altitude), seedlings of which the seeds were obtained from trees at Lenzerheide (1,550 metres or 5,052 feet altitude), and from the Engadine (1,800 metres or 5,886 feet altitude), began their growth a week before the offspring of trees of Winterthur (545 metres or 1,767 feet), Adlisberg or Pilatus (1,000 metres or 3,270 feet altitude), but they stopped growing from a fortnight to six weeks before these latter.

To take one or two typical cases : Engadine and Lenzerheide seedlings in 1902 began their growth on April 17, and stopped on July 1 and June 20 respectively. The Adlisberg seedlings began on April 28 and did not stop till August 12.

Similarly with the Larch (four-year-old seedlings). When planted at Adlisberg (670 metres), the offspring of Ponte trees (2,100 metres or 6,867 feet altitude) began on May 18 and stopped growing on July 2. Those, however, whose seed was gathered at Bonaduz (700 metres or 2,289 feet altitude) began on May 24 and ended on August 18.

So also with Sycamore (*Acer pseudoplatanus*). Seeds gathered at Alp Drusen (1,600 metres or 5,232 feet) began in 1904 to bud on May 2 at Adlisberg, and had lost their leaves on October 8. But seeds gathered near Adlisberg itself began on April 15, and did not shed their leaves till October 24 ! This probably explains why it is that the annual growth in length was found to be so much greater when the seed was obtained at

* *Centralblatt für das gesamte Forstwesen*, 1887, p. 149 ; 1895, p. 7 ; 1899, p. 49.

† *Forstw. Centralblatt*, 1898, p. 537 ; *Mittheil. d. deut. dendrolog. Ges.*, Poppelsdorf, 1895, p. 49.

‡ *Allgem. Forst- und Jagdztg.* 1900, p. 81.

§ *Forstw. Centralblatt*, 1904, p. 123.

much the same altitude as the experimental station where it was grown. That the trees of these very high altitudes have developed the habit of working during a very much shorter space of time than their allies in the valleys below is quite distinctly made out from the enormous series of observations in Professor Engler's paper.

This is a fact of great importance to practical foresters, for it seems to show that climatic adaptations can be inherited; in other words, that an inheritance of acquired characters does take place in the case of trees.

The results as shown by photographs and tables are not a little striking. In the Sycamore the growth in height of the Adlisberg seedling in the third year was 41.9 cm., whilst that of the offspring of Alp Drusen trees was only 21.3 cm. The total height of the Ponte (2,100 m.) larch seedlings at Adlisberg was 21.8 cm., whilst those from Bonaduz (680 m.) were 75.6 cm. In the case of *Picea excelsa*, the height above ground of Engadine seedlings grown at Adlisberg was 21.8 cm., whilst those from Adlisberg seed at the same place were 36.1 cm.

These are but a few examples taken from the numerous tables which may be said to conclusively prove, so far as the experiments have been conducted, that the seeds of trees from very high altitudes do not grow at all satisfactorily at low altitudes.

On the other hand, they are probably the best to plant in the mountains where their parents were produced. On this point also there is abundant evidence. Gardens were made at twenty-two different experimental stations at altitudes ranging from 880 m. to 1,880 m. above the sea.

Nor is it only in this question of rapidity of growth that inherited characters are made manifest. The high-level trees have proportionately longer roots, they are more closely beset with needles, and the latter are shorter than those of the low-level seedlings. All these characteristics are inherited. The thickness of the bark is greater and the leaves are better protected against drought in the high mountain sorts. They also endure the winter better in elevated experimental gardens than the larger lowland seedlings. But they seem to be quite as susceptible to late frosts as the lowland ones.

An important point, on which Professor Engler lays great stress, is that large seeds, whatever their origin, produce on the whole larger and heavier plants than small ones. That, of course, is a very important fact in forestry.

Another very important practical point is connected with the growth-forms of the Larch. Where the soil or climate produces in the general larch population of a district a bad shape of stem, that peculiarity can be inherited. It is true that this point is not so fully insisted upon, but it is a fair deduction from the experiments.

On the other hand, where a tree has been checked in development, shaded or "dominated" by its neighbours, although in other ways healthy, then its offspring do not differ perceptibly from those of the "overbearing" trees beside it.

It must not be understood that Professor Engler is an anti-Weismannist. On the contrary he endeavours, every here and there, to show that his paper does not conflict with the orthodox Weismannian

creed. It is, however, really an exceedingly clear proof of the inheritance of acquired characters.

The following quotation is worth giving *in extenso* :

"Whether the lowland and highland firs are to be considered (with Cieslar) as physiological varieties or whether one ought to speak of climatic forms (Schröter) I will not decide. The expressions Species, Variety, Race, have been manufactured by man in order that he may be the better able to find his way in the endless variety of organic nature.

"As a matter of fact there are neither Species nor Varieties, but only individuals. The better we learn to know Nature, the more difficult it becomes strictly to define such terms, and so the greater becomes the general confusion."

It is, of course, uncertain whether such differences would persist during the whole life of the tree, but the "mountain characters" have been preserved for the first seven years of the life of the trees. Nobody at present living can justifiably expect to be living sixty-three years hence, when the question may be decided by the examination of trees seventy years old. In the meantime it certainly seems the safest plan to suppose that these inherited characters will not be lost.

It is shown in Früh and Schröter's classical work on the Moors of Switzerland that the *Picea excelsa* was amongst the first trees (with Birch and Alder) to enter that country after the retreat of the glaciers at the end of the Great Ice Age. The temperature at that time may have been very similar to that now existing in the mountains. Thus Professor Engler holds that these high-altitude firs had at that time their slow growth and other characters adapted to low temperatures, and that the lowland *Picea excelsa* acquired their present characteristics at a much later period. This would be in the time of the Helvetii and in the earlier part of the Middle Ages, when the woods of Silver Fir and deciduous trees had been cleared away. In the times of the Swiss lake villages *Picea excelsa* seems not to have existed in the low grounds. So that the adaptation of the lowland *Picea excelsa* to its present place has not required a very long period.

It is very unfortunate that there is no possibility of publishing in English, and *in extenso*, such papers as this of Professor Engler, but what has been said gives some idea of the scope and importance of his researches.

TUFTED PANSIES.

By D. B. CRANE.

"THESE are hybrids of pansies and alpine violets. The term 'tufted' has been very properly used to distinguish plants of a spreading habit—like pinks, aubrietias, and alpine violets—from plants with single erect stems like, say the stock, lupin, and aster. Sometimes the two forms of habit occur in the same family; for instance, there are violas that are tufted and violas that are not—the German, French, and other pansies in our gardens do not spread at the root as tufted pansies do. Plants of this 'tufted' habit are often a mass of delicate rootlets even above the ground, so that they are easily increased. Hence, when older pansies die after flowering, those crossed with the alpine species remain like true perennials. The term 'pansies' is a good one in all ways. Without an English name, we should always have confusion with the Latin name for the wild species. It is now agreed by botanists that all cross-bred garden plants—including tufted pansies, of course—should have popular English, not Latin names. 'Bedding Violas' is a vulgar compound of bad English and bad Latin; whereas 'tufted pansies' is a good English name with a clear meaning."—*The Garden*, January 16, 1892.

Few subjects in the long list of beautiful garden flowers can show the improvement to be seen in the tufted pansy (*Viola*) to-day; and much of this advance has been achieved within the last two decades. Indeed, within the last fifteen years, developments of a remarkable character have taken place. Varieties that were popular in the eighties are seldom met with to-day, the few exceptions being plants that possess some very marked trait in their character, and they are very limited in numbers. 'Bullion,' rich yellow, and 'Ardwell Gem,' sulphur-yellow, are two varieties which may be taken as instances. The former is valued because of its earliness and its free-flowering propensity, and the latter owing to its procumbent habit and persistent blossoming. 'Ardwell Gem,' too, is the parent of two or three excellent varieties, each of which has a beauty of its own. This variety gave us 'Duchess of Fife,' 'Goldfinch,' and 'White Duchess'—a family quite distinct from all others. Generally speaking, however, the newer introductions in many instances completely eclipse the older kinds—colour, form, habit and constitution each exhibiting improvement. The free-flowering propensity that has always characterised the *Viola* is well maintained in the newer productions, and one only needs to see them planted on a larger scale and the plants grouped in masses to appreciate them. Beauty in many respects may be seen in varieties of more recent introduction; instead of the selection of colours being almost exclusively confined to yellow, white, and blue, as was the case in earlier days, the range of colours is now considerably enlarged. There are shades of yellow, varying from the palest primrose to the richest orange-yellow; white, from the purest snow-white to rich cream;

blue in varying tones of pale lavender-blue and heliotrope-blue to the deepest and richest imperial blue ; several shades of purple, and numerous intermediate tones of colour, such as blush, lilac, lavender, rosy lilac, and others somewhat difficult to describe. Quite a host of prettily margined flowers are also in evidence. In some instances the margin resembles a picotee edging, while in others it is broad and irregular. The fancy type of flower, of which the well-known variety 'Countess of Kintore' may be regarded as a typical representative, shows considerable development. Newer varieties are much improved, form and finish of flower showing marked improvement, and the colours are pleasingly varied. Some of the darker markings give the blossoms quite a rich, velvety appearance, and the flowers possess plenty of substance.

Until eighteen years ago, flowers of all types of the *Viola* were always rayed or pencilled, these lines radiating from the centre of the blooms ; and, when neatly represented, added to their attractiveness. In many cases, however, the rays are so heavy and coarse that they detract very considerably from the beauty of the flower. With the advent of the rayless type of the tufted pansy the whole aspect of things changed, and for the better too. To the persistent efforts and painstaking work of the late Dr. Chas. Stuart, M.D., Chirnside, Berwickshire, we are indebted for this delightful improvement. He has told us that he fertilised *Viola cornuta* of the Pyrenees with the pollen of a garden pansy named 'Blue King,' and ripened a pod containing twelve seeds, which were at once sown ; this was done in 1874. The resulting seedlings were a complete revelation. Each flower was identical in character, having the long spur or horn as seen in the under petal of *V. cornuta*. Still persisting in his efforts, Dr. Stuart made other crosses, some of which were failures. The seedlings above referred to were then crossed with various coloured pansies, the results being flowers showing every other colour except yellow. In this way, the beautifully tufted habit so much to be desired was perpetuated ; and all the blooms were possessed of the horn or keel of *V. cornuta*. Afraid lest these crosses should become too similar to the pansy, Dr. Stuart took pollen from the original *cornuta* hybrids and fertilised some blooms of those above described. These seedlings had flowers three times larger than *cornuta* and were of various colours, tufted in habit, and free-blooming. A trial of *Violas* at Chiswick at that time having been arranged, Dr. Stuart sent plants of his latest efforts for comparison with others. The results were remarkable, the Committee awarding him no less than six first-class certificates. It was not until 1887, however, that the rayless flower he had so long hoped to produce was forthcoming. Keeping a sharp look-out on his seedling beds, he, in 1887, observed a whole flower entirely rayless and with a most pronounced almond-like perfume. There appears to be some uncertainty as to the parentage of this variety, as Dr. Stuart, in writing to a friend, referred to it as a "chance seedling." The plant was named 'Violetta' and represents quite a distinct type of plant. The flowers are small, and for this reason the progeny are described either as "Violettas" or 'Miniatures.'

For a few years Dr. Stuart and other raisers were busy in their efforts to increase the number of these beautiful flowers. Newer kinds of

varying tints were met with from time to time, and there seemed a fair prospect of success attending their introduction. But the *Violettas* have not achieved the distinction they deserve, which may possibly be due to the impatience of growers who expected the plants to make the rapid and vigorous growth that the ordinary types of the *Viola* invariably do. These miniature-flowered kinds make comparatively slow growth, and to be seen at their best should be left undisturbed for two or three years. Treated in this way the plants are a distinct success. They then develop into charming little tufts. At the moment, varieties of the '*Violetta*' type are not by any means numerous, and I have been careful to acquire stock of all that can be got. Last season (1905) several crosses were made with the object of increasing the number, and some 138 seedlings were raised late in the autumn. These plants are just coming into flower, and although there are many disappointments, the proportion of really good things is most encouraging. White flowers, of varying form and density, blue and blush-coloured blossoms have already developed, and I am hoping before the end of June to make a selection of other shades of colour. The miniature-flowered kinds are essentially plants for the rock garden, as here they are less likely to be interfered with, and in this way develop into tufts of a delightful character. The *Viola* Conference of 1894 laid down some rules to define the ideal properties of the miniature type, as follows :—

First. FORM.—The flowers may not be circular, as in the florist's pansy, but narrow and more oval in form, and the petals smooth and of good substance.

Second. COLOUR.—The colour should be bright, clear, and striking, whatever the shade. The eye should be bright gold or orange, and may run into the lip on the under petal, but *no central ray or marking is admissible*, and whether shaded, edged, or self-coloured, the colours should be well contrasted.

Third. FRAGRANCE.—The flowers should be highly perfumed, which property is one of the invaluable charms of this type.

Fourth. SIZE.—Size, as a point of excellence in this type, deserves consideration as we depart from the broad lines generally laid down for florists' flowers, and consider the flowers should not be more than $1\frac{1}{2}$ inches across as a maximum, and 1 inch across as a minimum. Flowers ranging between these sizes will afford ample ground for admiration, and will be more suitable for small glasses or the exhibition spray.

Fifth. HABIT.—The habit of the plants should be dwarf and procumbent, the foliage small and bright, the leaves close together, the joints short, and the habit bushy, with flower-stalks of such length as will bring all the flowers well together.

Dr. Stuart, when writing of *Violas* generally some years ago, said : "Most strains of tufted pansies are bred the wrong way, and in consequence lack the fibrous tufty root which makes the *Violetta* strain perennial." For this, he on many occasions emphasised the importance of making *V. cornuta* the seed-bearing plant. He also said, "pollen from *V. cornuta* applied to the pansy produced a common enough form of bedding pansy." This probably accounts for so many of the varieties raised by other persons possessing a poor or indifferent habit.

The progeny of 'Violetta' has also enriched our gardens with another beautiful and distinct type of the *Viola*. With pollen from 'Violetta' Dr. Stuart crossed a well-known white-rayed self, and this yielded 'Sylvia,' a variety which for a time was more largely grown than any *Viola* then in cultivation. This is a most interesting plant, bearing in the greatest profusion lovely creamy-white rayless blossoms. In this instance also, the habit is ideal and the constitution robust. This variety was the pioneer of a race of plants that are better able to withstand the strain upon their resources in the south, where, during periods of hot and dry weather, other less hardy strains not infrequently fail. 'Sylvia' has been one of the parents of quite a lot of really good things, and, although difficult to trace because of the haphazard raising of new varieties by some growers, this variety, both in respect to its blossoms and habit, has since been met with on many occasions. It perpetuates itself by seed propagation more than most others. I have seen quite a large area of seedlings from 'Sylvia' in which many of the plants were identical with the parent variety, and also a large number so closely resembling it that only the keenest enthusiast could distinguish the difference.

Subsequent to the introduction of 'Sylvia' Dr. Stuart, by taking pollen from rayless flowers and crossing 'Violetta' with it, succeeded in raising many new and choice kinds. Some of the more noteworthy are 'Blue Gown,' mauve blue; 'Primrose Dame,' primrose; 'Florizel,' lilac blush; 'Rosea pallida,' a shade of very pale rose; 'Christiana,' white, flushed yellow on lower petal; 'Ethereal,' and others. 'Blue Gown' was the beginning of better things in the way of flowers of a blue colour. This plant is tufted and blossoms in profusion. As soon as the plants become established, no matter how small, they begin to flower at once, and flower continuously until the late autumn. This is typical of the whole of Dr. Stuart's varieties, and speaks volumes for their vitality and adaptability for gardens in the south. It will be noticed that the colours of the varieties just enumerated are new and distinct, and in consequence were very heartily welcomed.

Owing to their somewhat soft tones of colour, there were writers ungenerous enough to write in terms anything but complimentary to them in this respect. It is not too much to say that they marked an epoch in the history of the *Viola*, as subsequent years will prove. Plants of the 'Sylvia' type in many respects are similar to those of the 'Violetta' strain, those of the former, however, being more vigorous in growth. In the spring, when new beds and borders are planted with the two types just referred to, very small plants are usually received. However, these small pieces establish themselves very quickly and in a short time come into flower. Like the miniature-flowered kinds, the progeny of 'Sylvia' excel when left in their flowering quarters for two or three years in succession. In this way their true beauty is exemplified. Rock gardens in which these types of the *Viola* largely preponderate are a glorious picture. The rayless strains, by careful selection, are now fixed, and if only the work that was begun by Dr. Stuart be persisted in there is no reason why, in time, every colour possible in the *Viola* should not be represented in both types. Flowers of the 'Sylvia' strain at first were of slightly less than normal size, but succeeding novelties have increased

in diameter. The flowers are borne on stiff erect footstalks well above the foliage, which gives a delightful carpeting of greenery.

Dr. Stuart, unlike most other raisers, was working on definite lines; the procumbent and tufted habit peculiar to almost all the plants raised by him bearing, so to speak, the hall-mark of the quality of his work. Plants such as these maintained their characters under the most trying conditions, and for perpetuating the stock provided an abundance of excellent material. The 'Sylvia' and 'Violetta' strains of plants propagate with ease. Either by cuttings or division of the old plants stock may be increased very readily, the latter method answering remarkably well.

Consequent on the introduction into commerce of Dr. Stuart's novelties, other raisers appeared to take advantage of them for the purposes of cross fertilisation. Succeeding years saw the progeny in flower in the gardens of various raisers; many of the newer varieties had special points of merit, and in consequence were eagerly sought after. For the first few years it was an easy matter to trace the parentage to 'Sylvia,' owing to the form of flower and habit of that plant. As time elapsed, however, these features were less pronounced, the crossing and re-crossing of one variety with another having the effect of obliterating the valuable characteristics of the parent. This is, in some respects, a fact to be deplored, as so many of the newer introductions possess a habit of growth that would require a deal of imagination to describe it as "tufted." Vast improvement in the quality of the flowers has taken place, but the ungainly habit of plants raised by a process different from that observed by Dr. Stuart tends to lessen their value from a garden point of view. The habit of many of the plants precludes one from using them for garden embellishment. Exceptions to this rule, in so far as habit is concerned, are carefully noted, and as opportunity offers notoriety is given to the better varieties. Varieties bearing flowers of a rayless kind very largely predominate at the present time, lists and catalogues increasing in size with the beautiful novelties added each season.

One cause for regret at the moment is the introduction of so many so-called exhibition *Violas*. That the flowers are finely represented cannot be denied, and when set up in sprays of six or more blooms they certainly are most attractive. As representing a triumph of the modern florists' skill they are a great achievement, but what of their habit? In most cases the plants are of little or no value in the garden, as their habit of growth is coarse and they lack the free-flowering quality of their smaller and more interesting rivals—the bedding sorts. In the early spring the growth is very strong and coarse, and as they increase, their own weight, combined with an ungainly habit, causes them to fall over. The plants make a number of lateral growths, which ultimately make them less awkward. This type of plant much resembles the 'Fancy' pansy in its style of growth, and when contrasted with the habit of a true tufted pansy, which emits numerous shoots through the soil round about its base, it is easy to appreciate the better constitution and more lasting character of the latter. Dr. Stuart once wrote: "The fashion of showing tufted pansies in sprays done up with wire is open to criticism; but it seems the fashion and we must submit in the meantime. There is just

a question whether or no the tufted pansy should ever be shown in sprays at all." These large-flowered exhibition *Violas*, as they are usually termed, are frequently recognised in the north by an award of a first-class certificate, and this, in the eyes of the florist, enhances its value. But when represented in sprays at the leading southern shows the inexperienced southerner is very apt to be misled into purchasing plants that are next to useless to him. Purchasers can hardly be expected to make inquiries as to the habit of plants they may order, when looking through a number of sprays deftly set up by practised hands. As a consequence these large-flowered sorts must lead to considerable disappointment. Dr. Stuart says we must submit, but this cannot go on for ever. The public surely should have some protection, as this system of representing the flower is far from satisfactory. I am quite in accordance with Mr. William Robinson, who has, on several occasions, expressed the opinion that the tufted pansies should be exhibited as growing plants. In this way the public can better appreciate their value in the garden, and see for themselves their form and colour together with the character of their display. Plants having an undesirable habit would then be quickly relegated to their proper place, and those possessing a habit of a true tufted kind would as a consequence attain the prominence they deserve. These remarks do not apply to *Violas* set up in sprays as a whole, but more particularly to the immense florists' flowers, in which habit of plant appears to be a secondary matter.

The *Viola* Conferences held at the Botanical Gardens, Edgbaston, Birmingham, in 1894 and 1895, and at the Royal Botanic Gardens, Regent's Park, in 1896, assisted very materially in the later development of the tufted pansy. Although not attended by many of the public, the Conferences were productive of much good. Enthusiastic raisers and cultivators of the *Viola* met together on these occasions, and a much needed impetus was thereby given to the development of the flower. Papers on many aspects of culture, &c., were read by different authorities, and information of a valuable kind disseminated. Specially interesting was the contribution of Dr. V. B. Wittrock, Director of the Botanic Gardens, Bergisland, Stockholm, Sweden. This was forthcoming in the form of notes from his copies of *Viola* studies in which several species were represented, accurately drawn by skilful artists from living specimens under the direction of Dr. Wittrock himself. A paper of this description gave those present an excellent impression as to the possibility of dealing with several species hitherto neglected by the hybridiser. Dr. Stuart's paper on the "Newer Varieties of the *Violetta* Type" in 1895 was conclusive evidence of the developments that were taking place, and gave one a good impression of the rapid strides the rayless kinds were making. Not the least interesting event in connection with the 1896 Conference was the trial of *Violas* in the Royal Botanic Gardens, Regent's Park; this brought together a collection of plants such as had never been represented together before. Most of the catalogued varieties then in cultivation, both old and new, together with a good number of interesting seedlings, combined to make the trial one of a unique character. The quarters allocated to the trial were carefully prepared, and the planting completed within a period of a few days. The trial gave one an excellent opportunity

of making copious notes, and afforded facilities for observing how the newer kinds compared with those of earlier origin. The Committee of Inspection selected some thirty stocks to which they awarded marks equivalent in value to a certificate of merit, and subsequently made selections, under fourteen different headings, of varieties of a dwarf character that were of tufted growth, and taller kinds for associating with other plants. Comparatively few, however, will compare with those of more recent introduction.

There is little doubt that many of those who attended the Viola Conferences went home determined to do something in the further development of the tufted pansy. Sufficient had been illustrated, both at the Conferences and the trial, to show that, although a great deal had been done, much more remained to be achieved, and the future seemed full of possibilities. It was during these three years of the Conferences that flowers of the rayless kind first came into prominence, and on the last occasion of meeting (1896) two rayless yellow varieties, of great promise, were submitted to the body of experts, and each received a first-class certificate. At that period rayless yellow pansies were almost unknown; there were two or three, however, and great store was set on these until the advent of the two varieties which received certificates. On this account the newer kinds were heartily welcomed. They both showed a great advance on any yellow varieties previously introduced, and yet they were so dissimilar. 'A. J. Rowberry,' a flower of oval form and rich orange-yellow, was one, and 'Pembroke,' a bright yellow, almost circular, another. Mainly through the crossing of these varieties we are in possession to-day of a magnificent series of yellow flowers. Yet at one time there was quite a dearth of really good yellow varieties, with or without rays. The fusion of these kinds has, by a succession of effort, given us a progeny, the flowers of which it would be difficult to determine the parentage. Although we have many superb yellows at the present time, I am inclined to believe that we shall not get a really satisfactory plant until the newer yellow kinds are used for fertilising *V. cornuta*. Success of a permanent character appears to be indissolubly associated with the free use of *V. cornuta* as seed-bearer, and as there are now so many beautiful rayless flowers with which to make crosses, the task of the hybridiser should be a much easier one than formerly. Other species of the Viola of which little is known may, as opportunity offers, be experimented with, and there is the possibility that by these means new hybrids may be brought into existence, as in the case of the species to which so much prominence has been given in these notes. Simple though the culture of the tufted pansy may be, that it is better understood to-day cannot be denied, and this has been an important factor in the more recent development of the plant. Few growers who make a planting annually would think of using the same quarters two or three years in succession, unless the soil be renewed or a heavy dressing of good manure be given to the ground. Contrary to the opinion universally held, the Viola is a deep-rooting subject. On one occasion a plant was lifted from the open border and the greatest care exercised in its removal. On being placed on a table it was ascertained that the roots were running through the soil quite three feet from the surface. Such a voracious feeder must necessarily draw upon the resources

of the soil, and for this reason it is easy to understand how quickly it must become impoverished, and the plant fail, unless renewed with soil of a rich and lasting character each season. Regarding the planting: for an early spring display, plant in warm or sheltered situations in October; but in the case of the plants being required to flower continuously from early summer till quite late in the autumn, late February or early March is the better time.

EVOLUTION AND ADAPTATION.*

A Criticism.

By Rev. Prof. G. HENSLOW, M.A., V.M.H., &c.

THE central idea of this book is to supersede Darwin's "Origin of Species by Means of Natural Selection" among fluctuating individual differences, by the Mutation-theory of De Vries. The author does not accept Darwin's alternative view of the origin of species by means of "the direct action of changed conditions of life," the results being "definite variations," by which "a new variety will arise without the aid of natural selection."†

In one sentence Dr. Morgan appears to recognise this possibility: "If a species begins to give rise to a large number of individuals of the same kind through a process of discontinuous variation, then it may happen that a new form may establish itself," &c.; otherwise the author repudiates the process.

With regard to mutations he says: "Whether an organism that arises [by the survival of only those mutations that are sufficiently adapted to get a foothold] shall persist, depends on whether it can find a suitable environment" (p. 468).

It is thus seen that here, as in Darwinism, there is *no natural law*, correlating the appearance of the mutations or variations, respectively, with the necessary environments. "Chance" reigns supreme with both theories.

The feature, therefore, common to the two theories is that the new variations or mutations arise *independently of the conditions of life* best suited to them. With Darwin the variability‡ is stimulated by the latter; but not with De Vries, by whom the stimulation is supposed to come from *within*, so that the mutation has to *find* a suitable environment or die.

An example will illustrate the author's contention. Darwin considered the loss of flight in domesticated ducks and fowls to be due to disuse, and the drooping ears of rabbits, &c. to the same cause.

Dr. Morgan says: "Those ducks would have been most likely to remain in confinement that had less well-developed wings; and hence at the start artificial selection may have served to bring about the result" (p. 94). But analogous structures with correlated habits among long-domesticated beings are innumerable, and never to be seen in wild animals, as they would be quickly exterminated; how then could they have arisen except in consequence of disuse under domestication?

On the other hand, fowls which have escaped into woods and breed

* By T. H. Morgan, Ph.D.

† *Origin of Species*, 8th ed., pp. 6, 7, and *Animals and Plants under Domestication*, ii. 271.

‡ "Variability," i.e. the capability of varying, is often used by writers, including Darwin, for "variation," i.e. the result of variability.

there develop offspring which in a few generations completely recover their power of flight.

Dr. Morgan rightly shows that individual or fluctuating variations which oscillate about a mean or "mode" do not, as a rule, supply a basis for new species; because it is a *sine qua non* that all characters of a true species must have hereditary constancy—relative, that is, as long as the environment is constant—but Dr. Morgan omits this latter requisite. As an example, variation in size of the leaves and flowers is one of the commonest of fluctuating elements; thus *Ranunculus Ficaria* has no recorded varieties, but an abundance of individual differences in England. In Malta, however, the leaf and flower are invariably much larger than in England; hence they have become fixed characters and the plant is known as var. *calthæfolia*.

Dr. Carl Pearson appears also to hint at a recognition of Darwin's alternative, but includes selection, as in a quotation made by the author: "If a race has been long under the same environment, it is probable that only periodic selection is at work, maintaining its stability." No "selection" really exists at all, as *all* individuals have grown in response to the same climatal conditions.

Dr. Morgan does not hesitate to criticise Darwin's theory severely; and he quotes Darwin's observations on "checks to increase," which runs parallel with Malthus' "Essay on Population"; but it is all really beside the application of natural selection *as applied to the origin of species*; for specific characters depend entirely upon morphological variations, *i.e.* in *details of structure alone*. Hence Dr. Morgan rightly shows that "the struggle for existence only determines the Distribution of Species," not their origins.

Dealing with the Neo-Lamarckian school, he discusses the question of the inheritance of acquired characters; but, as the book is on "Evolution and Adaptation," to refer to all the effects of experimental mutilations and diseases, &c., seems to be entirely beside the question; for, even if such were inherited, they have no classificatory value, upon which species entirely depend.

Moreover, it is a question which is most easily answered by plants. Thus, *e.g.*, the tendrils of *Ampelopsis hederacea* (the Virginian creeper) do not form adhesive pads until *after* contact is sustained with a wall; whereas in *A. Veitchii* they are already partially formed *before*, but only completed after contact. Hence they are hereditary structures solely induced by mechanical irritation of the *soma*.

Again, roots of radish, as well as of turnip and rape, are globular or elongated, according as the seed is sown in a compact or loose soil. Yet, by selection, these features are now hereditary. Similarly, short and long carrots were produced in the same way. Analogous cases can be multiplied to any extent.

Now, with regard to mutations, they are new species which are "all at once there." The theory stands, therefore, in sharp contrast to the selection theory of Darwin. They correspond to "sports" or Darwin's "single variations." But the question is, what causes them to appear? The author declines to enter into any discussion as to causes of mutation, just as Darwin did for variations. The weight of experience proves that

it is the changed conditions of life which first stimulate the organism to vary; the hereditary feral constancy is "broken," and then responsive action on the part of the being follows. There is every reason to believe that this is what took place with De Vries' mutations. *Enothera Lamarckiana* had long been cultivated, and the plants dealt with had first escaped from some garden into a field, there experiencing two different environments. He then transferred them to a third, his own garden, planting them in a manured border. There is nothing surprising in their variations appearing under the circumstances.

Nature is perpetually making analogous experiments. Thus ordinary land plants often grow near to, and then in, the water; e.g. *Cardamine pratensis*, *Bidens cernua*, grasses, *Ranunculus repens*, &c. Then the usual adaptations to water at once appear.

To make these hereditary the seeds must be sown for several generations in water. How long is not known; but the dissected, submerged, leaf of the water crowfoot is hereditary now, for it is retained on plants raised from seed in a dried-up pond or in the garden. Many amphibious plants in a similar manner change.

Such and many other cases are illustrative of responsive changes in the organism, which adapt it to a new environment. Of such, the author says, "few as the facts are, they require very careful consideration," &c. (p. 319). He betrays here a want of knowledge, as far as plants are concerned. I accumulated many in my book,* published in 1895, and can now add very many more. Dr. Morgan says "that the effects of climate and food are only transitory factors." I am afraid it is quite the reverse. The effects depend entirely on the length of time the organisms have been subjected to them. M. Bonnier, in a recent paper on "Les Plantes du Plateau des Nilghirris,"† has described how European plants become changed and adapted to the new climate after some years; but those renewed every year by European seed never change, as they have no time to do so.

Dr. Morgan thinks that inheritance acquired by long-continued action of the environment "is not likely to commend itself," and "there is no evidence in support of it" (p. 888).

The evidence is, in fact, abundant, both inductive and experimental. Arguing against "adaptation," he says, if Nägeli were right, "all organisms living under the same conditions should show the same characters" (p. 331).

He seems here to betray an unfamiliarity with nature. As a matter of fact, all plants do so in the general way of having xerophytic characters under drought and hydrophytic in water, &c. But the different kinds of structure adopted by plants are very various. Some are conspicuous by spinescence and hard wood, others by succulency, almost devoid of all woody tissues; others are hairy or woolly, while some are glabrous but with coriaceous foliage; such and many other types are xerophytic. He adds, "there are to be found as many exceptions as conformations to the rule." I have not found it so, but among the five hundred or more species of heath in Cape Colony I discovered one of a totally different

* *Origin of Plant Structures*.

† *Rev. Gén. de Bot.* vol. xvii. p. 289.

type. It had broad oval leaves, but it lived on rocks within the moisture of a waterfall.

Dr. Morgan declines to follow Darwin's acceptance of Lamarck's application of disease as the cause of atrophy, as in the case of blind animals living in the dark. "The connection that appears to exist between the degeneration of a special part and the environment in which the animal lives finds its explanation simply in the fact that the environment makes possible the existence of that sort of mutation in it" (p. 856). This would imply that blind animals can only live in the dark.

Similarly he argues "an animal does not become degenerate because it becomes parasitic, but the environment being given, some forms have found their way there" (p. 857). Dr. Morgan in thus arguing ignores the enormous amount of inductive evidence based on the accumulation of coincidences between blind animals and darkness, and between parasites (both animal and vegetable) and their hosts—evidence which satisfies the soundest logic.

Referring to the usual view that "roots in dry soil are diverted to more favourable positions by the presence of greater quantities of moisture," he says: "This may, I venture to suggest, be putting the cart before the horse. The plant may be only able to exist whose responses are suited to certain external conditions, and these determine the limits of distribution of the plant." This will hardly explain the fact that "a poplar sent a root 80 feet horizontally, including its drip beneath the foundations of a wall, and then passed into an old well to the depth of 18 feet."* In the deserts of Damaraland the 'Narras,' a spinescent cucurbitaceous plant, sends its roots downwards 40 feet to reach the water-level.

In his "Summary" the author admits that "no attempt has been made to account for the causes or the origin of the different kinds of variation" (p. 452). This is to be regretted, because it is by no means so difficult a task, though we can never unravel the mystery of life and its functions; but admitting a responsive power in protoplasm and the nucleus, everything else follows in securing adaptations.

Again, he would separate the "origin of species" and "the meaning of adaptation," failing to see that adaptive characters are identical with specific. Thus, species of British euphorbias are known by their vegetative characters as much as by their inflorescence. Similarly, the South African types are known by their massive succulent stems. Both are adaptations to the climates of England and South Africa respectively. On the other hand, Dr. Morgan thinks that "it seems probable that, in general, organisms do not respond adaptively to the environment and produce new species in this way; and, in the second place, there is no evidence to show that variation from internal causes is so regulated that only adaptive structures arise." The latter sentence is true; a plant *responds* to environmental conditions, but many structures are not of any benefit to it. Thus drought causes the arrest of branches and leaves, and hardens the woody tissues, so that spinescence is often the result, and a stunting of the plant ensues. Comparing such a plant of the desert with another of the same kind grown with plenty of water, the latter will

* Lindley's *Theory of Horticulture*, p. 19.

be a larger, far more vigorous plant, with no spines, but branches and leaves in abundance. Nevertheless, the former grows and persists for years, though, comparatively speaking, it cannot be said to thrive; but it may put on a number of adaptive structures such as hair, a thick cuticle, a secretion of wax, sunken stomata, water-storing tissues, &c., all of which are strictly adaptive to the climate.

Here again *induction* and *experimental proof* are now far too great to be ignored; so that the sole interpretation is that plants vary "definitely," as Darwin said, in direct response to the new conditions of life. Whatever the number of seedlings may be, they all vary alike, so that there is no selection in the Darwinian application, though not 5 per cent. may survive, because of the struggle for life. This is natural selection in the Malthusian sense, and only results in the distribution of species and never their origin.

It may be more difficult to see how animals vary in response to the conditions of life, but the problem can easily be solved with plants; not only is it far easier to grow them than make experiments with animals, but Nature's own experiments are so abundant that he who runs may read.

Present-day Ecologists, who are now working in the field, are fast coming to Neo-Lamarckian views and abandoning Darwinism.

In conclusion, there is one point I should like to repeat and emphasise. Both in Darwin's and Dr. Morgan's theories it is maintained that variations arise *without* any correlation to the environment being provided for. Hence *chance* has to settle the matter of survival in *both* cases.

In the Neo-Lamarckian view, the variation does not arise unless the new conditions of life excite the variability of the organism. This aroused, the plant, *i.e.* the seedling as it grows, develops new structures *in response to the new conditions*. Hence there is a *natural law* connecting the variation with the environment, and chance has no place in the process.

Lastly, while Darwin's and Morgan's views are both *unproven hypotheses*, "adaptation by response" is based upon an infinite amount of actual proofs, both in nature and cultivation.

SPECIES AND VARIETIES: THEIR ORIGIN BY
MUTATION.*A Criticism of De Vries.*

By Rev. Prof. G. HENSLOW, M.A., V.M.H., &c.

AFTER studying De Vries' work with the above title, the question that arises in one's mind is: Has he discovered anything new, or is he only giving a new name to a well-known fact?

The essence of Mutation lies in the sudden and spontaneous appearance of a "form" with several *small deviations* in morphological characters from the parent species, which are *constant* when tested by heredity.

If variations be not constant, then they form "fluctuating varieties."

Darwin's theory, however, also requires constancy, or a new species could never have arisen at all. Thus he says: "Any variation which is not inherited is unimportant to us; but the number and diversity of inheritable deviations of structure, both those of slight and those of considerable physiological importance, are endless."* "Perhaps the correct way of viewing the whole subject would be to look at the inheritance of every character whatever as the rule, and non-inheritance as the anomaly."† So too M. Carrière said: "Tout tend à se reproduire et même à s'étendre, que par conséquent les modifications peuvent non-seulement devenir héréditaires, mais qu'elles peuvent encore servir de moyen pour arriver à d'autres modifications."‡ Again, "Tout individu a une tendance à reproduire ses caractères."§

Indeed, if the variation were not constant from its first appearance and receive successive increments as Darwin supposed, how could the new variety or species come into existence at all? Similarly, if we follow the views of Neo-Lamarckians, and regard new variations which arise through the direct action of changed conditions of life not to be constant, no new form would be stable or any permanent adaptation exist as seen in every living being. This is the view of Warming, Costantin, and other Ecologists, as well as Darwin himself, in his alternative view to natural selection. Let us now get a clear idea of this new conception of species. We all know what is meant by a Linnean species, which is, at least theoretically, based on two categories: (1) a collection of morphological characters of sufficient importance to differentiate it from all other species of the same genus; (2) a presumable if not provable hereditary constancy.

De Vries, however, regards a species not as an entity, but an aggregation of "real units" or "elementary species," just as a "genus" is an aggregate of "species." "Any form which remains *constant* and *distinct*

* *Origin of Species*, &c. 6th ed. p. 9.† *Op. cit.*, p. 11.‡ *Production et Fixation des Variétés*, 1865, p. 9.§ *Ibid.* p. 17.

from its allies in the garden is to be considered as an elementary species."

Systematists are often obliged to lay more stress on *differences of structure*, while De Vries places emphasis on *constancy*. Any offspring which show perpetual variations are individual or fluctuating varieties, and so cannot form elementary, *fixed*, species.

What, then, causes constancy or fixity of characters?

Now De Vries does not seem to realise or emphasise enough the necessary *conditions* to secure subsequent stability of a variation of structure. He seems to regard it as an innate quality, *per se*. But practical horticulturists know the necessity, first, of *isolation*, then of *selection*, generation after generation, till a high percentage is maintained if absolute identity cannot be secured. Moreover, they must be grown in the *same conditions*. Thus Professor James Buckman observed: "Experiments with seeds of plants showing any particular tendency, and especially if repeatedly grown in the same soil, will ever result in an increase of the peculiarity." * As an illustration, it is now known that the "long" and "short" or "turnip" forms of radishes, carrots, rape, and turnip are the results of sowing the seed in loose and compact soils respectively, yet by selection these forms have become hereditary.

Though "everything tends to become hereditary," as M. Carrière observed, there is every degree between a quickly-acquired constancy and none at all, even with the aid of the most careful selection possible. The latter are ever-varying, fluctuating forms, which seed merchants can only issue as "mixed," as De Vries observes. When De Vries raised his elementary species which he called *gigas* and *rubrinervis*, he probably grew them year after year under precisely the same conditions wherein constancy was to be expected.

Nature affords numerous analogous instances in any genus with a large number of species of which many are sure to be local and characteristic of the places in which they grow, as *e.g.* the subspecies of *Polygonum aviculare* as described by Sir J. D. Hooker in his "Students' Flora of the British Isles."

If a form has apparently *lost* some character of the parent, or it has become *latent*, or if it exhibits some feature already known in an allied species, such De Vries calls a "variety" (p. 141). As examples he mentions the "wheat-eared carnation" and the "green dahlia," as both have *lost* their flowers; but the former, at least, can reproduce them.

Species, therefore, are "progressive" in acquiring something new; varieties are "regressive" in having lost something (p. 15). He mentions *Pyrola* and *Monotropa* as examples, as they are polypetalous; but as the polypetalous state undoubtedly preceded the gamopetalous, it might be regarded as atavistic or "degressive," as De Vries calls it, being probably brought about by the tendency to degradation through saprophytism.

A difficulty here strikes one at once; for both progressive and regressive features may occur in one and the same flower or plant. Thus, in several cultivated Composites, the florets have acquired strange forms in their corollas, unknown in the wild state or when first cultivated, as in

* *Treasury of Botany*, s.v. 'Brassica.'

chrysanthemums &c.; such might be called "gains," but they are accompanied by "losses" of the essential organs. The law of compensation seems thus to interfere somewhat with De Vries' definitions.

It is true De Vries adds, 'No great changes have been attained without acquiring new qualities on one side and reducing others to latency' (p. 222). But he does not seem to allow for the fact that "latency" itself may disappear. Thus, the water crowfoot has acquired the dissected type of submerged leaf, like almost all dicotyledonous aquatic plants, by the influence of the water. When, however, the seeds are grown on land, though the *anatomy* resumes the ancestral aerial characters, the external morphology is retained, and is therefore constant and specific. The "latent" completed leaf of land forms has gone.

He alludes to "the conception of latency of characters as the common source of the origination of varieties" (p. 242); but this is not Darwin's view, as he seems to imply, for Darwin attributes them to the influence of "changed conditions of life," leading to "definite or indefinite results," i.e. the variations in the offspring.

In raising his mutants, elementary species and varieties, De Vries observes: "Seed-cultures are henceforth to be considered as the sole means of recognising the really existing systematic results of nature" (p. 61); but he overlooks the fact that culture with a new and prepared soil is the very best means of breaking up Nature's constant species, as we shall see in his own cases.

Let us consider his examples. *Enothera Lamarckiana* is a garden plant, long cultivated, and unknown, at least to De Vries, as a wild species, only occurring in Europe as an escape, if not cultivated. It is a plant requiring insect fertilisation, though rare instances of self-fertilisation have been seen. It may then, perhaps, have been a hybrid. When he discovered it in a field in 1886, both stems and rosettes (being a biennial) were seen to be highly variable, and soon distinct varieties could be distinguished among them, but *many were too weak* to live a sufficiently long time in the field. De Vries transplanted the rosettes into his garden, with the well-known results.

The impression left on one's mind is that several of his "forms," to use an indefinite expression, had nothing more exceptional than what may happen with any cultivated plant, which has broken down its natural stability of character, and that the *cause* was the various conditions of the soil in which it had been previously, and was by himself, cultivated.

The two "strong species," as he calls them, *gigas* and *rubrinervis*, remained constant from their first appearance; and he observes: "Constancy is not the result of selection or of improvements; it is a quality of its own" (p. 562).

But it has been shown above that, to secure constancy, the form must be grown in the same conditions which produced the variation. One asks, therefore, was not *gigas* grown continuously under the same conditions? If so, its constancy might have been foreseen with considerable probability.

Gigas.—Stem stouter but not taller than that of *Æ. Lam.*: internodes shorter; leaves more numerous; flowers closer together; corolla larger; fruit only one-half the size; seeds fewer but larger.

Similarly with regard to *RUBRINERVIS*.—Stem more slender; bracts narrower (spikes and flowers same as of *Ce. Lam.*); veins red (but not absolutely lacking in *Ce. Lam.*); leaves narrower; stem and leaves very brittle, due to turgidity and a weak development of bast, &c.

Now, I do not think that any florist, much less a systematic botanist, would regard these characters as more exceptional than may be found in many a "form" of cultivated plants, such as occurs in the Cabbage tribe, root-crops, in Darwin's "Hero" among Ipomœeas, of which he says, "The self-fertilised children of 'Hero' certainly inherit the powers of growth of their parents," &c.* A similar permanency existed in his white *Mimulus*.

De Vries observes that it is often difficult to decide whether a given form belongs to one or another of these groups (p. 564). So here, *gigas* has reduced internodes, ovary and number of seeds: such "losses" ought to make it a "variety"; while the more numerous leaves and larger corollas and larger seeds may be regarded as "gains," which entitle it to be an "elementary species."

But now there is a very suspicious fact about nearly all his forms, which betrays itself in his descriptions. Thus, of *rubrinervis*, *oblonga*, and *nana*, they are all characterised by a "brittleness"; *albida*, by chlorosis and by being a "very weak species." *Oblonga* is, as an annual, "very slender and weak"; and if *oblonga* be a biennial, it is "a low plant with a limp stem. This and its branches have bent tips, and both are very brittle."

It is impossible not to see that all these feeble productions are suffering from some sort of degeneracy or other, probably arising from a too moist and too richly manured soil.

De Vries does not tell us how his borders were prepared; but it is to be gathered from the following paragraph, which shows how various individual differences arise from minute differences in the soil.

Speaking of the external causes of the individual differences among seedlings, he says (p. 720): "Moisture and manure differ on different portions of the same bed in a way unavoidable even by the most careful preparation. Some seeds germinate on moist and rich spots, while their neighbours are impeded by local dryness or by distance from manure. Some come to light on a sunny day and increase their first leaves rapidly, while the following day the weather may be unfavourable and greatly retard growth. The individual differences seem to be due, at least in a very great measure, to such apparent trifles."

The immediate cause, then, of these characters seems to be excessive moisture and over-nourishment, tending to make the tissues too succulent and consequently brittle, as well as to intensify the production of foliage in *gigas*; and, on the other hand, to reduce the number of seeds and size of the fruit.

Unless I misunderstand him, De Vries does not always seem to be quite consistent. He lays great stress on "constancy," and observes that Wittrock describes several local types (of pansies) which proved to be constant in his pedigree cultures. Some of them produced other forms (pp. 42, 48). Therefore they were not altogether constant. Similarly,

* *Cross and Self Fertilisation*, p. 48.

speaking of introductions into Europe, he alludes to *Enothera biennis*, "the evening primrose, and many others could be given. They have not developed any special European features after their introduction" (p. 695). But elsewhere he tells us that this plant has mutated into a form he calls *cruciata* (p. 587).

I think, therefore, that one may agree with Mr. Clements, who observes that "the evidence from the mutants of *Onagra* (as to constancy) is not convincing. Indeed, where there can be no question of the occurrence of mutation (*i.e.* sporting) in plants, a fact known for many years, the facts so far brought forward in support of the 'Mutation theory' fall far short of proving the high value of mutability for the origin of species."*

In conclusion, I would call attention to a misrepresentation of Darwin, from whom De Vries claims support which Darwin repudiated. With regard to Evolution he says: "Darwin has recognised two possibilities. One means of change lies in the sudden and spontaneous production of new forms from the old stock. The other is the origin by means of natural selection." What Darwin maintained was that *extreme* forms such as what are understood as "sports" have *not* been a source of evolution.

Darwin's alternative to natural selection was the direct action of the new conditions of life by which new forms arise "without the aid of natural selection."† De Vries passes this over in silence. But it is now being prominently insisted upon by Ecologists who cannot fail to see it in action in Nature everywhere.

* *Research Methods in Ecology*, by F. E. Clements, Ph.D., 1905.

† *Animals and Plants under Domestication*, vol. ii. p. 271, &c.

REPORT ON THE METEOROLOGICAL OBSERVATIONS MADE AT THE SOCIETY'S GARDEN AT WISLEY IN 1905.

By R. H. CURTIS, F.R.Met.S.

BEFORE giving a summary of the weather and of the meteorological observations made at Wisley during the past year, it may be of interest to point out that the Royal Horticultural Society was probably the first public body to institute a systematic series of meteorological observations in this country.

The observations were begun tentatively at Chiswick so long ago as 1825, with a set of instruments got together somewhat hurriedly; but in the following year they were placed on a more permanent and satisfactory basis, and the station equipped with a more complete set of instruments, obtained from the best makers of the day, under the superintendence of Professor Daniell, F.R.S., who formulated the general plan to be followed.

For nearly twenty years the observations of the barometric pressure, made three times a day; of the amount of vapour in the atmosphere, indicated by Daniell's hygrometer; and of the temperature of the air, were published *in extenso* in the Society's "Transactions"; and in 1871 the results of a discussion by the late Mr. James Glaisher, F.R.S., of the observations of temperature and of rainfall for forty-four years were published as a supplement to vol. ii., second series, of the Society's JOURNAL, under the title "Deductions of the Meteorological Observations made at the Royal Horticultural Gardens, Chiswick, in the years 1826-1869." At the close of 1874 this series of observations came to an end, after having continued for forty-nine years, and the instruments were dismantled and removed. In 1899, however, the observations were recommenced, the station having meanwhile been equipped with more modern instruments. The system of observation was also reorganised by Mr. Edward Mawley, F.R.H.S., and the late Mr. G. J. Symons, F.R.S., and up to 1908 a summary of the results for each year was prepared by Mr. Mawley and published in the JOURNAL. With the close of 1908 this second series came to an end, owing to the removal of the Society's Garden to Wisley, and the present series was begun in 1904. A description of the new site at Wisley, and of the instrumental equipment of the station was given in vol. xxix. part 4 of the JOURNAL, and no change has been made in either since that description was prepared. The instruments were examined and verified by me in the course of the year with satisfactory results, and the observations have been regularly and carefully made, without any break in their continuity throughout the whole period, by Mr. Thomas Frazer, assisted by Mr. Wallis.

January.—The weather throughout the month was unusually variable all over the kingdom, and spells of fine bright weather lasting for several

days alternated with others in which the weather was very broken and unsettled.

On the whole, westerly winds were the most prevalent, although over the southern counties easterly winds were not infrequent. Temperature was generally slightly above the average, but there were many exceptions to this rule in the Midlands and south of England. In most places the range of temperature was of moderate extent. Rainfall was below the normal amount everywhere, except in the north of Scotland, and the month was unusually dry; especially was this the case over the north-east of England, in parts of which only one-fourth of the usual amount of rain fell. Sunshine, on the other hand, was generally a good deal above the average, the totals averaging something like an hour per day more than the usual amount.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	88°·3		
Highest	"	"	"	...	...	54°·7	on the 6th
Lowest	"	"	"	...	...	20°·4	" 2nd
Lowest	"	on the grass	...	...	...	9°·0	" 2nd
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	37°·4	39°·7	42°·8
Highest	"	"	"	...	...	44°·1	43°·8 44°·5
Lowest	"	"	"	...	...	34°·3	37°·1 40°·5
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)							
	...	...	...	...	...	...	88
Rain fell on 11 days to a total depth of	...	...	...	...	...	...	1·08 in.
(Equivalent to about 5 gallons of water per square yard.)							
Heaviest fall on any day	...	...	...	...	...	0·74 in.	on the 16th
The prevailing winds were westerly.							
The average velocity of the wind was 7 miles per hour.							
There were 78 hours of bright sunshine, equal to 31 per cent. of the total possible amount.							

Sunshine was registered on 22 days.

February.—There was a marked contrast between the weather of the first three weeks of this month and that of its closing days, the former period being mild and dry, whilst throughout the latter there were strong cold winds, with rain and in some districts occasional hail and snow.

Up to the last week the dominant wind current was westerly, but then followed northerly and north-easterly winds, which several times reached gale force in most parts of the country. The mean temperature of the month was everywhere higher than usual, and this was especially the case over south-eastern England. The range of temperature was nowhere large, and indeed in many districts it was decidedly small, the coldest period being at the commencement of the last week. Rainfall was again much below the average, except in the north of Scotland, and by the close of the month the deficiency had become very marked. Sunshine was more frequent than usual over England and Wales, but less so over the greater part of Scotland.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	42°·4		
Highest	"	"	"	...	...	52°·6	on the 16th
Lowest	"	"	"	...	...	31°·0	" 20th
Lowest	"	on the grass	...	...	...	23°·5	" 12th

	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	40°·8	41°·8	42°·6
Highest " " "	44°·6	43°·8	43°·8
Lowest " " "	37°·8	38°·8	40°·6
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	86
Rain fell on 14 days to a total depth of	...	...	0·54 in.
(Equivalent to about 2½ gallons of water per square yard.)			
Heaviest fall on any day	...	0·18 in. on the 26th	
The prevailing winds were westerly.			
The average velocity of the wind was 9 miles per hour.			
There were 82 hours of bright sunshine, equal to 30 per cent. of the total possible amount, and there were but 4 entirely sunless days.			

March.—The weather was very varied in character during the month, but generally it was warm, rough, and boisterous; the strong winds and gales being accompanied by a good deal of rain, hail, or sleet, and by more thunderstorms than usually occur in March.

The wind was chiefly from west or south-west, although in Scotland it blew a good deal from south and south-east; its force was frequently strong, and occasionally it reached that of a severe gale. The temperature was generally high, in some districts as much as 8° above the average, and its range was considerable. The warmest period was usually near the 20th, and the coldest during the opening days of the month. Rainfall was mostly in excess of the average, and in some parts of the kingdom considerably so, the fall being spread fairly uniformly over the month. Sunshine also was generally in excess of the average, although the month was a wet one, but some districts in the north and others in the south proved exceptions to this general rule.

Observations made at Wisley :

Mean temperature of the air in shade	45°·0		
Highest " " "	60°·9 on the 22nd		
Lowest " " "	26°·9	"	4th
Lowest " on the grass	17°·1	"	4th
	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	43°·4	44°·0	43°·9
Highest " " "	46°·9	46°·9	45°·9
Lowest " " "	37°·9	40°·5	42°·3
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	84
Rain fell on 22 days to the total depth of	...	...	3·62 ins.
(Equivalent to nearly 17 gallons of water per square yard.)			
Heaviest fall on any day	...	0·63 in. on the 15th	
The prevailing winds were south-westerly.			
The average velocity of the wind was 9 miles per hour.			
There were 127 hours of bright sunshine, equal to 35 per cent. of the total possible amount, and there were only 4 sunless days.			

April.—This was a month of characteristically changeable and unsettled weather, and it was also exceptionally dull and cold. Three or four thunderstorms were experienced, and early on the morning of the 23rd—Easter Day—slight shocks of earthquake were felt over the northern half of England.

The winds were distributed fairly uniformly round the compass, with

a slight predominance of south-westerly winds in most districts, and their force was upon the whole moderate. The temperature was very generally below the average, the highest readings of the thermometer occurring about the middle of the month, and the lowest about a week earlier, the range between the two extremes being considerable. Rainfall was slightly in excess of the normal amount in most districts, but at Wisley it was below the usual amount. Sunshine was everywhere deficient in amount, and especially so over the south-western counties, where the month proved to be an exceptionally dull one.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	46°·8		
Highest	"	"	"	...	...	61°·2 on the 16th	
Lowest	"	"	"	...	...	32°·1	" 7th & 8th
Lowest	"	on the grass	...	...	...	21°·7	" 7th
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	46°·7	47°·4	46°·7
Highest	"	"	"	...	...	50°·0	49°·6
Lowest	"	"	"	...	...	43°·0	45°·7
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	...	80
Rain fell on 18 days to a total depth of	...	...	...	...	...	...	1·44 in.
(Equivalent to about 6½ gallons of water per square yard.)							
Heaviest fall on any day	...	...	...	...	...	0·32 in. on the 9th and 30th	
The prevailing winds were south-westerly but winds blew with nearly equal frequency from all points.							

The average velocity of the wind was 8 miles per hour.

There were 103 hours of bright sunshine, equal to 25 per cent. of the total possible amount, and—for the third month in succession—there were but 4 entirely sunless days.

May.—A quiet month, with fine, bright weather, and on the whole rather warmer than usual, although there was a well-marked cold period during the first week and another at the beginning of the fourth week. Thunderstorms traversed the south-east of England on the 30th.

Northerly to north-easterly and westerly to south-westerly winds were those most generally experienced, but their force was usually moderate or light. The mean temperature nowhere differed greatly from the average, but in most places it was slightly in excess; the warmest period was the third week, and more particularly the latter half of it, when upwards of 80° was registered in the south-east of England and 79°·1 at Wisley. The rainfall was generally small, and the number of days on which rain fell was few. At the Garden the fall was less than half an inch—only one-third of the normal amount—and this was spread over seven days. The amount of sunshine was much above the average over the southern counties, but it became less as one proceeded northwards, till in the north-east of England and in Scotland it amounted to less than the average.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	52°·4		
Highest	"	"	"	...	...	79°·1 on the 29th	
Lowest	"	"	"	...	...	29°·3	" 23rd
Lowest	"	on the grass	...	...	...	22°·0	" 23rd

					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	53°·4	52°·9	50°·4
Highest	"	"	"	...	60°·2	57°·9	53°·2
Lowest	"	"	"	...	49°·6	49°·6	47°·7
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	...	64
Rain fell on 7 days to a total depth of	...	...	...	...	...	...	0·48 in.
(Equivalent to rather more than 2½ gallons of water per square yard.)							
Heaviest fall on any day	...	...	...	...	...	0·14 in. on the 16th	
The prevailing winds were northerly and westerly.							
The average velocity of the wind was 5½ miles per hour.							
There were 258 hours of bright sunshine, equal to 54 per cent. of the total possible amount, and only on one day—the 14th—was no sunshine recorded.							

June.—The weather of this month was very varied, and presented some striking contrasts at the same place during different periods, and between different places at the same moment.

The winds blew with nearly equal frequency from all points of the compass, but they were usually of moderate force and rarely exceeded that of a strong breeze. The mean temperature differed very little from the normal, but as a rule was slightly above it; its range, however, was generally large, and in some places in the northern half of the kingdom it amounted to nearly 50°. Rainfall was excessive over the southern counties of England, but was deficient in the north and over Ireland; and whilst in the north of England rain fell on but four or five days, it did so in the south on nearly three days out of every four all through the month. Sunshine was, as might have been expected, very deficient over the rainy southern portions of the country, but abnormally abundant in the north.

Observations made at Wisley:

Mean temperature of the air in shade	...	...	...	...	59°·4		
Highest	"	"	"	...	...	77°·9 on the 27th	
Lowest	"	"	"	...	...	45°·0	" 15th
Lowest	"	on the grass	...	...	...	37°·8	" 15th
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	60°·0	59°·0	55°·6
Highest	"	"	"	...	64°·1	62°·6	58°·6
Lowest	"	"	"	...	54°·5	55°·2	53°·6
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	...	79
Rain fell on 17 days to the total depth of	...	...	...	...	...	...	4·60 ins.
(Equivalent to about 19 gallons of water per square yard.)							
Heaviest fall on any day	...	...	...	...	...	1·25 in. on the 5th	
The prevailing winds were from north and north-east.							
The average velocity of the wind was 5½ miles per hour.							
There were 154 hours of bright sunshine, equal to 31 per cent. of the total possible amount, and there were 5 sunless days.							

July.—This was a quiet, warm and dry month, with a full average amount of sunshine. There were a few thunderstorms, which, however, were seldom severe. One which occurred in Hertfordshire on the 9th was accompanied by heavy hail and rain, and did much damage to fruit and gardens generally.

Winds were chiefly of a westerly type, and as a rule were moderate or light in strength. Temperature was higher than usual all over the

kingdom, and on several occasions the thermometer rose to over 80°, the range of the mercury approximating to 40° over many inland districts. Rainfall was again less than the average. Over the whole of the southern half of England it amounted to less than an inch, and in several districts to less than a quarter of an inch. At Barnet, however, the exceptionally heavy fall of 2·4 inches occurred in the thunderstorm referred to above. Sunshine was much more than the average in amount over the greater part of the country, but there was again a deficiency over south-west England and southern Ireland.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	65°·4
Highest " " "	...	...	...	...	82°·6 on the 26th
Lowest " " "	...	...	...	...	44°·4 " 7th
Lowest " on the grass	...	...	...	...	38°·6 " 19th
			At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	66°·2	64°·9	61°·0
Highest " " "	...	...	68°·9	66°·7	62°·7
Lowest " " "	...	...	68°·0	61°·7	58°·6
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)					
	...	...	...	...	70
Rain fell on 6 days to the total depth of	...	...	...	...	0·54 in.
(Equivalent to about 2½ gallons of water per square yard.)					
Heaviest fall on any day	...	...	...	...	0·20 in. on the 22nd
The prevailing winds were south-westerly and westerly.					
The average velocity of the wind was 4½ miles per hour.					
There were 248 hours of bright sunshine, equal to 50 per cent. of the total possible amount; and on no day was less than 2½ hours of sunshine recorded.					

August.—This was another month of unsettled weather. Thunderstorms were frequent and in several instances severe, and generally the month was cool, wet, and dull.

The winds blew from all quarters, but chiefly from between west and south, and in some instances they attained considerable strength. Temperature was below the average nearly everywhere, although as a rule the deficiency did not exceed 2°. There were no exceptionally high readings of the thermometer, and the range of the mercury was not large. Rainfall was generally in excess of the average, and in several instances largely so. Over the south-east of England the total fall did not amount to 2 inches, but in other districts it exceeded 5 inches, and in the neighbourhood of Dublin it was 8·6 inches. This was chiefly due to an extremely heavy fall of upwards of 4 inches on the 25th, which resulted in a disastrous flood in parts of Co. Wicklow. Sunshine was deficient in most parts of the kingdom.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	60°·2
Highest " " "	...	...	...	...	75°·4 on the 14th
Lowest " " "	...	...	...	...	43°·7 " 17th
Lowest " on the grass	...	...	...	...	35°·1 " 2nd
			At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	62°·6	63°·3	61°·6
Highest " " "	...	...	65°·4	65°·6	62°·8
Lowest " " "	...	...	58°·5	60°·4	60°·3

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 74
 Rain fell on 21 days to the total depth of 2.16 ins.
 (Equivalent to rather more than 10 gallons of water per square yard.)
 Heaviest fall on any day 0.64 in. on the 28th
 The prevailing winds were westerly.
 The average velocity of the wind was $6\frac{1}{2}$ miles per hour.
 There were 187 hours of bright sunshine, equal to 42 per cent. of the total possible amount, and there were no entirely sunless days.

September.—The weather was frequently unsettled and was generally dull, with a good deal of rain. There were no very warm days, and the month was decidedly cool, frosts occurring on the grass more than once at exposed places.

The most frequent winds were from westerly points, and as a rule they were moderate in force. Temperature was below the average in nearly every part of the kingdom, and in some instances the deficiency was as much as 8°. The highest temperatures occurred during the first week, but they exceeded 70° in only a few instances. The lowest readings of the thermometer were recorded pretty generally during the third week, and in some districts they were below the freezing point. At Wokingham (Berks) 29° was reached, but at Wisley 85°.2 was the lowest point. Rainfall was slight all over the kingdom with a few exceptions. Sunshine was in excess of the average amount in Scotland, but below it in England and Ireland, the deficiency being most marked in the southern districts, which is very unusual at this season.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	55°.3
Highest " " "	...	...	...	...	72°.3 on the 3rd
Lowest " " "	...	...	...	...	35°.2 " 21st
Lowest " on the grass	...	...	...	...	29°.8 " 21st
				At 1 ft. deep.	At 3 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	57°.4	58°.9
Highest " " "	...	...	...	62°.0	61°.8
Lowest " " "	...	...	...	53°.8	56°.0
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	84
Rain fell on 16 days to the total depth of	...	...	...	...	2.10 ins.
(Equivalent to nearly 10 gallons of water per square yard.)					
Heaviest fall on any day	...	...	...	...	0.53 in. on the 25th
The prevailing winds were from south-west and west, and from north and north-east.					
The average velocity of the wind was $5\frac{1}{2}$ miles per hour.					
There were 116 hours of bright sunshine, equal to 31 per cent. of the total possible amount.					
There were 5 sunless days.					

October.—This was a cold, dry, quiet month, with an absence of the rough weather commonly experienced at the season. The first half was dull and sunless, but in most places this was compensated for by the latter half being exceptionally bright and sunny.

Winds were chiefly from westerly to northerly points, and generally light to moderate in force. Temperature was low all over the kingdom, and in many places the mean was 5° or 6° lower than is usual. The

maxima were invariably low, generally below 60°, and as a rule the minima were below the freezing point. The range covered by the thermometer was fairly large. Rainfall was again slight, except over some parts of the east coast. In Ireland the deficiency was very marked, many places having a total fall of less than an inch; but falls of less than 2 inches were general over the whole of the southern half of the kingdom. The total amount of sunshine was fairly good except in the extreme north, where it fell rather below the average.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	44°·9		
Highest	"	"	"	57°·4	on the	1st
Lowest	"	"	"	24°·5	"	26th
Lowest	"	on the grass	...	19°·1	"	17th & 26th
				At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	47°·9	50°·9	53°·1
Highest	"	"	"	53°·9	55°·8	56°·4
Lowest	"	"	"	41°·9	46°·5	49°·4
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	83
Rain fell on 12 days to the total depth of	...	...	...	...	...	1·48 in.
(Equivalent to nearly 5½ gallons of water per square yard.)						
Heaviest fall on any day	...	...	...	...	0·36 in. on the	29th
The prevailing winds were from south-west to north.						
The average velocity of the wind was 4½ miles per hour.						
There were 114 hours of bright sunshine, equal to 35 per cent. of the total possible amount, and there were but 4 entirely sunless days.						

November was a windy, unsettled month, with cold, damp air, a good deal of rain, and frequent fog. Thunder and lightning were not infrequent, and shocks of earthquake were felt in southern Lancashire on the morning of the 25th.

Winds were experienced with nearly equal frequency from all quarters, and occasionally they blew very strongly. Temperature was low, but the range of the thermometer was generally moderate, the maxima never rising to 60°, and as a rule only slightly exceeding 50°. Rainfall was in most places above the average, and in some parts of the kingdom it was locally heavy. On the east coast of England, however, there were many districts where the fall for the month failed to reach the small total of 2 inches. The amount of sunshine varied a good deal with locality; as is usual at this season it was especially small in the vicinity of large towns, but in entirely rural districts it was, as a rule, somewhat above the average for the month.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	41°·3		
Highest	"	"	"	54°·7	on the	26th
Lowest	"	"	"	21°·0	"	21st
Lowest	"	on the grass	...	14°·0	"	21st
				At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	42°·2	45°·2	47°·6
Highest	"	"	"	47°·0	48°·3	49°·6
Lowest	"	"	"	32°·4	41°·1	45°·1

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 92
 Rain fell on 20 days to the total depth of 3·17 ins.
 (Equivalent to about 14½ gallons of water per square yard.)
 Heaviest fall on any day 0·57 in. on the 10th
 he winds came with nearly equal frequency from all points.
 The average velocity of the wind was 6 miles per hour.
 There were 65 hours of bright sunshine, equal to 25 per cent. of the total possible amount; there was no sunshine registered on nearly half the days of the month.

December.—The month was a quiet one as regards wind, unusually dry, and at the same time abnormally mild. There was much fog and thick mist in the earlier days of the month, but the latter part was clear and bright.

The most prevalent winds blew from between south and west, and were for the most part moderate in force. Temperature was considerably above the average almost everywhere, as much as 5° in some western and northern districts. At the close of the first week the thermometer rose to 57° and 58° at many places, the lowest readings being as a rule between 20° and 25°, so that the range of temperature was much less than is usual in December. Rainfall was decidedly small, and heavy daily falls very few. In many parts of the country the month's precipitation was 2 and 3 inches less than the usual amount, and indeed in some parts, chiefly in the north-east of England, the total amounts were less than a quarter of an inch. Sunshine was somewhat irregularly distributed, some places having rather more and others less than the average, but the recorded percentages of the greatest possible amount were nowhere large.

Observations made at Wisley:

Mean temperature of the air in shade	...	...	...	...	40°·4
Highest	"	"	"	...	56°·7 on the 7th
Lowest	"	"	"	...	24°·2 " 11th
Lowest	"	on the grass	...	...	21°·9 " 11th
				At 1 ft. deep.	At 2 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	41°·3	43°·1
Highest	"	"	"	46°·4	45°·6
Lowest	"	"	"	38°·2	41°·8
				44°·1	
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	92
Rain fell on 15 days to the total depth of	...	...	...	...	0·57 in.
(Equivalent to rather more than 2½ gallons of water per square yard.)					
Heaviest fall on any day	...	...	...	0·10 in. on the 5th, 8th, and 27th days	
The prevailing winds were south-westerly.					
The average velocity of the wind was 5 miles per hour.					
There were 32 hours of bright sunshine, equal to 13 per cent. of the total possible amount. There were as many as 19 sunless days.					

The accompanying diagrams show in a graphic form the chief features of the preceding tables.

Fig. 87 shows first the departure of the mean temperature of each month from the average. It will be seen that the temperature did not fall below the average until August, which was the first of four consecutive cold months, the coldest being October. This spell of cold weather

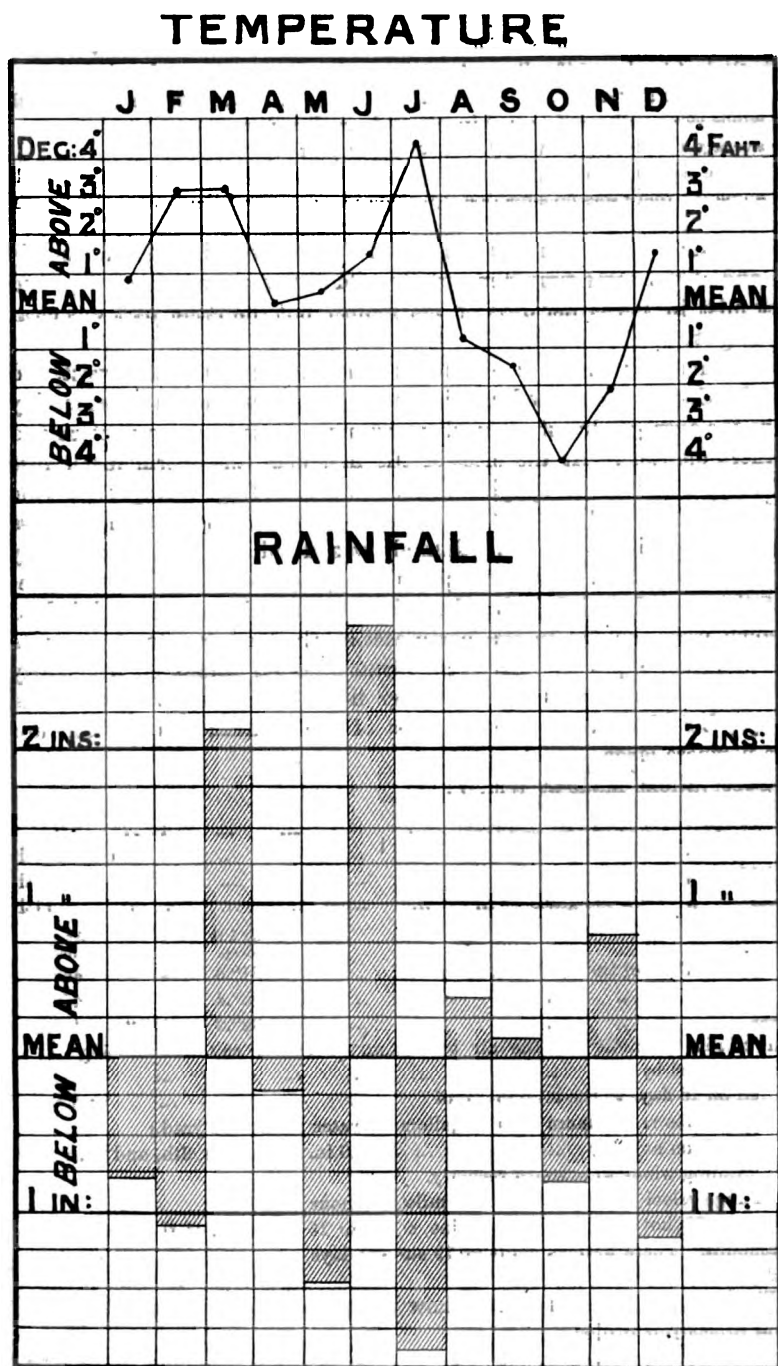


FIG. 37.—DIFFERENCE FROM THE AVERAGE OF THE MEAN MONTHLY TEMPERATURE OF THE AIR AND FALL OF RAIN AT WISLEY DURING THE YEAR 1905.

is in sharp contrast to the warm weather of the earlier months of the year.

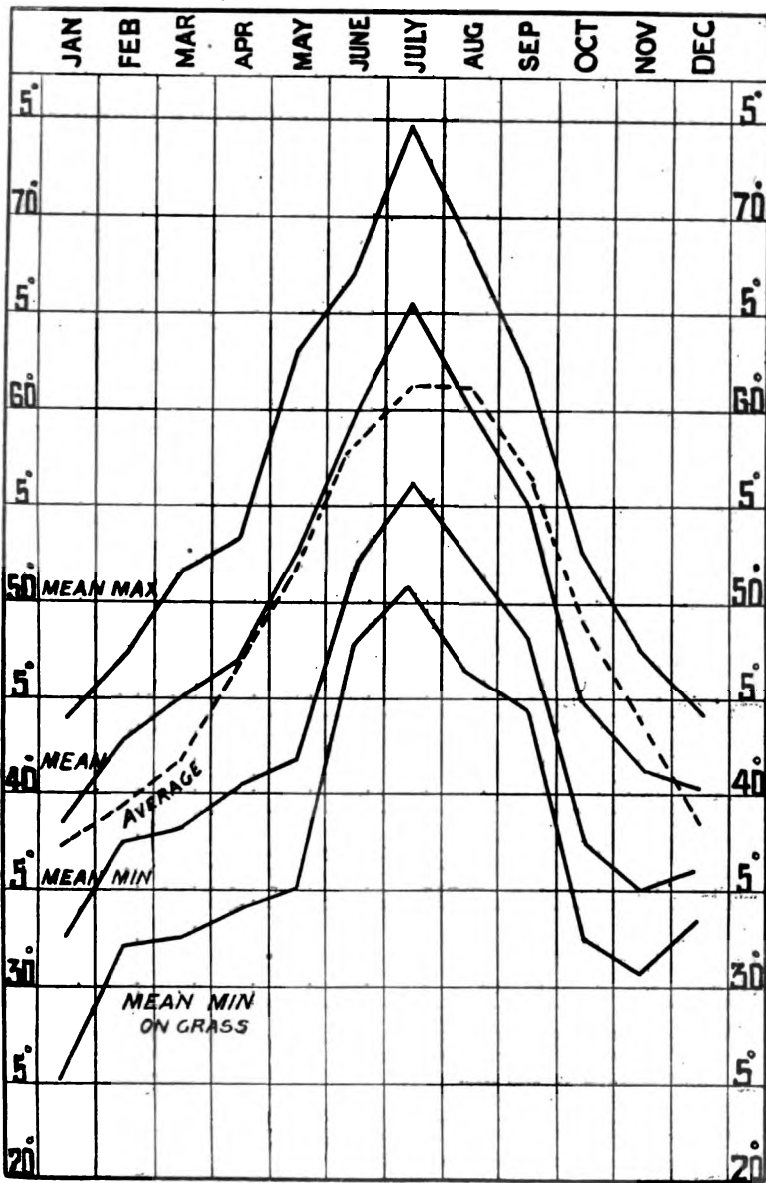


FIG. 38.—MEAN TEMPERATURE OF THE AIR FOR EACH MONTH OF THE YEAR 1905 COMPARED WITH THE AVERAGE; ALSO THE MEANS OF THE HIGHEST AND THE LOWEST OBSERVED EACH DAY, AND OF THE LOWEST TEMPERATURE RECORDED ON THE GRASS.

The lower part of fig. 37 shows the peculiar distribution of the rainfall, and contrasts very strikingly the heavy falls of March and June with the deficient rains of the preceding and following months.

Fig. 88 exhibits the monthly march of the temperature of the air, and fig. 89 that of the soil compared with the mean temperature of the air. From the latter diagram, it will be seen that the temperature of the soil

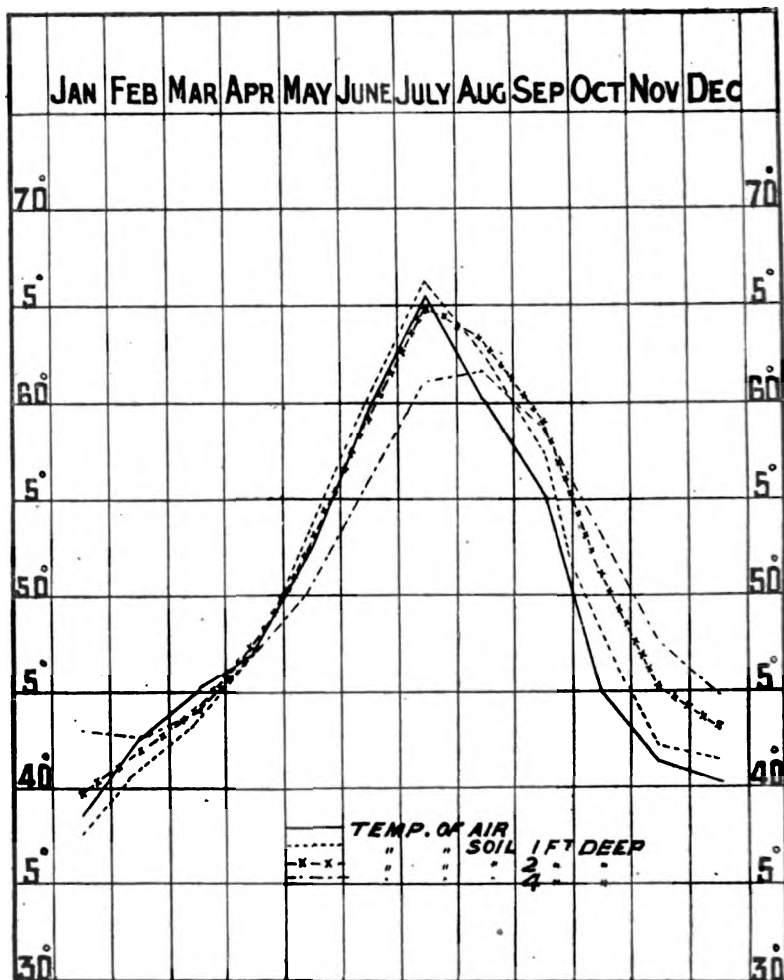


FIG. 89.—MEAN TEMPERATURE OF THE SOIL AT 9 A.M. AT A DEPTH OF 1 FOOT, 2 FEET, AND 4 FEET BELOW THE SURFACE COMPARED WITH THE MEAN TEMPERATURE OF THE AIR.

at depths of 1 foot and 2 feet follows very closely the monthly march of the mean temperature of the air up to July, but throughout the later months the soil, parting with its heat less rapidly than it absorbed it, remained warmer than the air till the close of the year.

REPORT OF THE SOCIETY'S CONSULTING CHEMIST,
DR. J. A. VOELCKER, M.A., F.I.C., F.L.S.

DURING the year 1905 thirty samples were submitted to me by Members of the Society for analysis.

Of these, eighteen were samples of water, six of them were soils, and the remainder artificial manures and miscellaneous materials.

The list of samples is as follows :—

Basic slag	1
Sulphate of ammonia	1
Artificial manures	2
Horse manure	1
Sludge	1
Waters	18
Soils	6

30

The samples of basic slag and artificial manure were of good quality, as also was that of sulphate of ammonia, this coming up to the guarantee of containing $24\frac{1}{2}$ per cent. of ammonia.

A sample of horse manure was submitted to me for the purpose of knowing whether it had been treated with disinfectants. As is well known, if disinfectants have been used for horses' dung which is to be employed for the purpose of making mushroom beds, the manure may be rendered practically useless for the purpose. In the case under observation, however, there was no indication of the presence of disinfectants, and different moulds were growing freely upon its surface.

The sludge gave on analysis the following results :—

Moisture	6.53
*Organic matter	33.65
Oxide of iron and alumina	6.22
Phosphate of lime	3.69
Carbonate of lime, &c.	33.73
Insoluble siliceous matter	16.18
	100.00
*Containing nitrogen	1.94
equal to ammonia	2.35

This sludge had evidently been well dried, and the analysis shows exceptionally good results, the material containing $8\frac{1}{2}$ per cent. of phosphate of lime and over 2 per cent. of ammonia; and, costing as it did only 2s. 6d. to 3s. per load delivered, a material such as this is decidedly useful for garden land.

Of the eighteen samples of water submitted, whether for drinking purposes or for garden use, only five of them were found to be of a really satisfactory nature. Two others were of more or less indifferent quality, and the remainder were distinctly polluted, several of them to a very large

extent. In one case, which was that of a presumed drinking supply, the water gave no less than 104 grains per gallon of total solids, included in which were 85 grains per gallon of salt and 80 grains per gallon of nitrates. It was ascertained that this supply was situated quite near the house, and that the well in question was only 17 feet deep.

Among the samples sent was one from the Society's Garden at Wisley, and this gave satisfactory results, the total solids amounting to only 7.2 grains per gallon, the water being one of soft nature as well as being quite fit for general use.

Among the waters submitted in regard to their suitability for garden use, there was one in respect of which the complaint was made that plants watered with it were suffering very seriously. An examination of this sample showed that it contained no less than 184 grains per gallon of total solids, included in which were 128 grains per gallon of saline matters, thus amply accounting for the injury done to the plants.

A sample from another supply in the same locality, but which was stated to do quite well for plants, was found to be of very different character to the last-mentioned, and to contain only 17 grains per gallon of total solids.

In the case of several samples of drinking water, they were found to be largely contaminated with drainage from garden land; and here it may be pointed out that the common practice of placing a well in the midst of a garden, where it is the custom to use manure heavily, cannot but lead to unsatisfactory results and may seriously affect the water supply.

Six samples of soil were forwarded for analysis and report, and in most of these the great deficiency was found to be that of lime. In one case a soil contained as little as .10 per cent. of lime, and the supply of this ingredient is in a large number of cases, I am convinced, as necessary for horticultural as for agricultural purposes. In other cases potash also was found to be a deficient ingredient.

IMPORTS AND EXPORTS AND ACREAGES AFFECTING
BRITISH HORTICULTURE.

STATISTICS OF INTEREST TO BRITISH HORTICULTURISTS.

IN view of the interest evinced in the statistics which have for the last two years appeared in the JOURNAL (vol. xxviii. pp. 597-600 and vol. xxix. pp. 700-703), and of the more general interest in such questions as foreign imports, these tables have been brought up to date and somewhat expanded. The general result might be regarded as satisfactory as the acreages under horticultural products are increasing and the imports of fruit and flowers are decreasing, but we still spend many millions sterling on imported fruit, vegetables, and flowers, most of which might be spent in this country, if we had more land under such cultivation, and if better and more scientific methods were more generally employed. The timber and forest statistics are less satisfactory, and although they may be regarded rather as agricultural, yet they have a very direct bearing on horticulture, because if less timber were imported more would be grown at home. This would considerably affect the rainfall. There are many gardens, especially in the Midlands and the North, which formerly were surrounded by bare hills and rocky slopes, but now are covered with firs and pines, and the difference is most striking.

TABLE I.—IMPORTS OF FRUITS.

	Quantities			Values		
	1903	1904	1905	1903	1904	1905
FRUIT :				£	£	£
Apples, raw (cwt.)	4,569,546	3,771,781	3,494,650	2,781,543	2,118,294	2,065,193
Apricots and Peaches, raw	9,678	13,466	23,391	21,584	22,907	51,963
Bananas, raw (bunches)	3,067,616	3,910,511	5,743,914	1,166,889	1,382,572	1,770,266
Cherries, raw (cwt.)	110,192	260,724	186,082	167,142	316,824	268,042
Currants, raw	76,419	116,888	82,438	110,535	143,993	94,590
Gooseberries, raw	84,812	36,216	17,169	28,444	31,024	11,941
Grapes, raw	684,084	863,572	700,049	715,057	827,634	761,632
Lemons	978,318	989,296	837,028	406,726	406,500	416,049
Nuts : Almonds	157,166	165,011	168,422	944,934	916,066	843,761
" other nuts, used as fruit	791,281	706,064	803,704	667,302	590,384	788,591
Oranges	6,176,762	5,863,264	5,068,626	2,275,400	2,193,149	1,949,491
Pears, raw	271,618	535,614	417,664	326,463	503,673	407,679
Plums, raw	594,626	493,707	480,391	622,268	526,438	524,673
Strawberries, raw	32,644	34,524	29,339	49,362	49,536	40,120
Unenumerated, raw	688,878	664,766	602,096	449,413	372,575	364,140
Total value of Fresh Fruit	—	—	—	10,362,764	10,006,345	9,983,120
FRUIT, DRIED :						
Currants (cwt.)	1,159,400	981,883	1,078,034	966,176	822,434	939,427
Raisins	768,191	669,444	737,072	1,150,541	994,675	990,581
	1,917,591	1,651,327	1,815,106	2,116,717	1,817,109	1,930,008

The enormous increase in the quantities of bananas imported between 1903 and 1905, as shown in the above table, probably accounts for the marked decline in the imports of such fruit as apples and oranges.

TABLE II.—IMPORTS OF VEGETABLES.

	Quantities			Values		
	1903	1904	1905	1903	1904	1905
VEGETABLES, RAW :				£	£	£
Onions (bushels)	8,619,919	8,992,136	7,585,951	1,003,016	1,076,472	1,094,693
Potatoes {						
From Germany . (cwt.)	2,228,695	1,652,290	26,586	422,569	332,821	4,988
" France "	2,796,483	4,157,698	1,937,314	839,791	987,243	622,008
" Channel Islands } . . "	1,103,215	1,249,043	1,122,950	649,496	431,447	562,121
" Other countries } . . "	3,021,809	2,984,934	578,344	691,382	686,460	214,493
Total	9,160,202	9,995,965	3,664,294	2,603,238	2,437,971	1,404,607
Tomatoes (cwt.)	1,071,927	1,134,721	1,187,193	953,192	1,007,274	970,579
Unenumerated	—	—	—	396,784	457,491	419,752
Total value of raw vegetables imported	—	—	—	3,958,214	3,902,786	2,794,938

Neither fruit nor vegetables are noticed among our exports in our Trade and Navigation Returns, and against the imports thereof, to the value of about £15,000,000, we can only show exports of preserves, which include the value of bottles, sugar, vinegar, &c. :—

TABLE III.—EXPORTS OF PRESERVES, &c.

	Quantities			Values		
	1903	1904	1905	1903	1904	1905
Pickles, sauces, and condiments, } including chutney	—	—	—	£	£	£
Vinegar (gallons)	—	—	434,071	577,178	631,276	764,711
Provisions, unenumerated (cwt.)	—	—	—	1,044,599	934,790	44,431
Confectionery, jams, and preserved fruits	319,736	314,879	345,376	801,067	812,213	828,148
	—	—	—	2,432,844	2,378,279	895,597
	—	—	—	2,432,844	2,378,279	2,532,897

We shall then do well to inquire how much of our land is now under fruit cultivation. And, as will be seen from the following table, not only the acreage under small fruits, but also that under orchards, again show a most satisfactory expansion, and we trust that the Report of the Departmental Committee of the Board of Agriculture on Fruit will still further stimulate and encourage the planting of fruit trees and bushes in this country (see R.H.S. JOURNAL, vol. xxix. pp. 510-559).

TABLE IV.—SHOWING THE ACREAGE UNDER SMALL FRUIT AND UNDER ORCHARD CULTIVATION, 1903-1905.

Year	Small Fruits			Orchards *		
	1903	1904	1905	1903	1904	1905
England	Acres 68,968	Acres 70,612	Acres 71,119	Acres 233,286	Acres 236,705	Acres 238,021
Wales	1,230	1,263	1,213	3,748	3,813	3,890
Scotland	5,954	6,072	6,493	2,449	2,490	2,482
Great Britain	76,152	77,947	78,825	239,483	243,008	244,393
Isle of Man and Channel Islands .	525	521	585	1,997	1,691	1,492

* The acreage under orchards is that of arable or grass land used for fruit trees of any kind.

Yet, of the 77,684,006 acres in the United Kingdom, only 245,815 (or less than 1 in 800) are under fruit cultivation.

THE IMPORTS OF FRESH FLOWERS.

The imports of fresh flowers continue to show a satisfactory decrease. In 1902 we received flowers to the value of £267,281; in 1908 the amount fell to £248,689; in 1904 to £242,454; and last year, 1905, it was only £202,217; but now that forcing is better understood, why should not this £200,000, or at any rate the greater part, be spent in England?

Surely it would not be difficult with proper management to produce azaleas, roses, or other spring flowers which may be seen at our early Shows at a price and in sufficient quantities to compete successfully with foreign importations.

With regard to the acreage under the cultivation of vegetables, the Board of Agriculture report as follows (we would remind our readers that the "vegetables" include those used for cattle-feeding):—

Of beans there is also an increased acreage, confined to England, both Scotland and Wales exhibiting a decline. The changes, as compared with 1904, are very varied in different counties; of the five chief bean-growing counties (with over 10,000 acres each), Cambridge, Lincoln, and Norfolk have decreases of from 1,000 to 2,000 acres, and Suffolk declines by over 400 acres; Essex, on the other hand, shows an increase of over 2,000 acres. The addition of 1,000 acres in the East Riding also represents a large increase. Peas, on the other hand, record a small decrease in England, and show an infinitesimal increase upon the small acreages in Scotland and Wales. As with beans, Essex shows the largest increase; but Lincoln, the chief pea-growing county, has a deficiency of over 4,000 acres.

Potatoes, with 608,473 acres, cover more land by 38,264 acres, or 6·7 per cent., than last year, and for the first time since 1871, when 627,691 acres were returned, over 600,000 acres have been planted with this crop in Great Britain. The increase over 1904 has been, relatively, somewhat greater in England than in Scotland, while in Wales there has been a slight decline. Cornwall and Devon also show a slight falling off, all other English counties reporting increases, which are most considerable in Lincoln, Lancaster, Chester, the West Riding and Cambridge in England, and in Forfar and Fife in Scotland. The extension during late years of potato-growing is a feature of English farming only, the total in Scotland being only now restored to that which it was before 1890, while the Welsh area has exhibited an almost continual decline since 1888.

The chief root crop, turnips and swedes, shows a decline of nearly 1 per cent., bringing the acreage down to 1,589,000 acres. Before 1887 the turnip crop of Great Britain stood at over 2,000,000 acres, and the shrinkage is most notable in England, where a 25 per cent. fall is recorded from that date as compared with one of 5 per cent. in Scotland. In the present year several counties record small augmentations, but these were insufficient to counter-balance losses of over 2,000 acres in Devon and of over 1,000 acres in Dorset, Salop, and Aberdeen, while a diminution of nearly that amount was noted in Fife and Forfar.

Mangolds, on the other hand, have slightly improved their position, the total area again exceeding 400,000 acres. The increase was entirely in England, and was most noticeable in Essex and Norfolk.

Cabbage shows a material increase, amounting to almost 5 per cent. It is most noticeable in the south-west, particularly Devon, and one or two collectors in that quarter mention an increasing tendency to substitute cabbage for roots as food for stock. The relatively small area under kohlrabi exhibits an even larger increase, viz. 12·7 per cent., nearly a fourth of the whole augmentation occurring in Essex, where there are over 3,500 acres under this crop. Rape, on the contrary, shows a loss of 3,891 acres, or 4 per cent., the decline being very marked in Lincoln; while vetches or tares display a considerable increase

(6·4 per cent.), more especially in the Eastern counties. Lucerne shows a further check to the extensions noted some years ago. The decline amounts to 4·2 per cent., and the total this year is a trifle below that returned in 1902; Essex, the chief lucerne-growing county, showing a decline of 1,253 acres.

Among other crops there are returned 12,694 acres under carrots, 2,838 acres under onions, and 441 under flax. The onion acreage, it may be noticed, has increased by 513 acres, or 22 per cent.; and while this is noticeable in most counties, it is most marked in Bedfordshire, where 148 acres have been added to the 480 under this crop in 1904.

ACREAGE OF WOODLANDS AND TRADE IN WOOD AND TIMBER.

Some of our readers will remember that two years ago * we referred to the hope which had been expressed by the Departmental Committee of the Board of Agriculture on Forestry, in their Report dated November 22, 1902, that "the inquiry conducted in 1895 concerning the area of woodlands be repeated by the Board of Agriculture, and the details concerning the timber crop grown upon them be ascertained." We now notice with pleasure that in the Acreage Returns of the Board of Agriculture for 1905 the suggestion has been carried out, and in the Memorandum prefacing the Returns it is remarked that "the difficulties of securing an exhaustive return of all land under wood have been pointed out in commenting on the previous returns of this nature; but it is believed that the special pains taken by the officers of Inland Revenue in the distribution and collection of the schedules have resulted in rendering the present return substantially accurate. It is to be observed, however, that in some instances the incision of woodland areas, which were formerly overlooked, may tend to vitiate comparisons with previous figures for particular counties or districts, and may account to some extent for apparent increases in the areas returned."

The woodland area is now returned under the several categories of (1) Coppice, *i.e.* woods, whether containing standards or not, that are entirely cut over periodically and reproduce themselves naturally by stool shoots; (2) Plantations, *i.e.* land planted or replanted within the last ten years; and (3) "Other Woods," which include all land (not returned as coppice or plantation) used altogether or mainly for the growth of wood (other than orchards), and the total figures are compared with those returned in 1895.

Summarising the new returns geographically in the groups of counties usually adopted for the purposes of the Agricultural Returns, the woodland acreage of 1905 was distributed as follows:—

Divisions	Total Woodlands in 1895	Coppice	Plantations (since 1895)	Other Woods	Total Woodlands in 1905
	Acres	Acres	Acres	Acres	Acres
I.—Eastern and North-Eastern	—	47,159	11,297	189,038	247,494
II.—South-Eastern and East Midland	—	270,883	15,580	318,303	604,866
III.—West Midland and South-Western	—	184,618	16,156	868,816	1,069,589
IV.—Northern and North-Western	—	36,663	16,614	341,547	393,824
ENGLAND	1,685,741	538,123	59,547	1,117,703	1,715,473
V.—WALES	181,610	16,733	8,690	169,999	184,361
VI.—SCOTLAND (Eastern)	878,765	8,645	22,768	421,489	452,902
VII.—" (Western)		14,370	16,639	308,466	348,507
Totals for Great Britain	2,728,116	576,871	103,683	2,087,669	2,768,243

* *R.H.S. Journal*, vol. xxviii. p. 600.

The present total area thus shown in Great Britain, 2,768,243 acres, is 42,127 acres in excess of that returned ten years ago. This extension was, however, confined to England and Wales, the total area of woods in Scotland showing a decline of 10,856 acres. The decrease north of the Tweed has occurred notwithstanding the fact that 85,407 acres of land are returned as having been planted or replanted during the past ten years, so that it would appear that the clearance of woodland areas by storms and from other causes has been considerably greater than the owners of land have been able to make good.

Some indications of the extent of planting or replanting which has apparently taken place within the past twenty-four years may perhaps be given by comparing the returns of plantations collected for 1891, 1895, and 1905 respectively. The areas planted or replanted in the three periods appear as under for the agricultural divisions above referred to :—

Divisions	1881 to 1891	1891 to 1895	1895 to 1905
	Acres	Acres	Acres
I.—Eastern and North-Eastern	5,879	3,145	11,297
II.—South-Eastern and East Midland	12,481	4,176	15,680
III.—West Midland and South-Western	14,270	4,484	16,158
IV.—Northern and North-Western	14,643	4,156	16,814
ENGLAND	47,273	15,961	59,847
V.—WALES	11,120	2,533	8,629
VI.—SCOTLAND (Eastern).	19,957	8,335	22,768
VII.—" (Western).	20,590	6,074	12,639
Great Britain	98,940	32,903	103,683

It will be noted that, whereas the earlier and later periods extended over ten years, the intermediate period embraced only four years. By dividing the figures in each case by the numbers of years represented, the apparent average annual rate of planting thus obtained may be considered to indicate approximately the relative amount of activity in woodland extension during each period. Subject to the caution already given as to the possibility of more complete returns, it would appear that planting was carried on in Great Britain, as a whole, during the past decade at the rate of 10,368 acres per annum, as compared with 8,225 acres during 1891–95 and 9,894 acres during 1881–91.

This tendency to reduced activity in the middle period, followed by greater activity after 1895, is suggested both in England (as a whole) and in Wales. In the Eastern counties, as well as in the group of counties lying on the Welsh Border, there is a suggestion of continuously progressive activity during the whole twenty-four years, but in all other parts of the country the general indication is in the direction just mentioned. In Scotland experience seems to have been more varied. In the Eastern and Lowland division the rate of planting has, on the whole, increased, whereas in the Western and Highland division it seems to have substantially diminished. This seems to be largely due to some exceptional activity in Inverness and Ross and Cromarty during the decade 1881–91.

IMPORTS AND EXPORTS OF WOOD AND TIMBER.

The subjoined tables, showing that our Imports of timber and wood (exclusive of wood-pulp) are thirty times as great as our Exports, are more convincing than any explanation can be:—

Imports	Quantities			Value		
	1903	1904	1905	1903	1904	1905
Hewn: Fir, oak, teak, &c. (other than pit props or pit wood).				£	£	£
From Russia . . . (loads)	291,665	278,787	244,887	680,511	664,809	574,414
" Sweden . . . "	35,537	33,553	20,108	63,539	59,722	35,872
" Norway . . . "	64,686	66,009	64,278	117,586	164,746	92,909
" Germany . . . "	185,069	126,514	134,908	548,750	390,940	415,181
" United States of America (loads)	191,995	173,585	147,798	1,034,065	914,074	731,237
" British East Indies . . . "	54,109	30,879	39,636	705,203	425,805	588,941
" Canada . . . "	66,559	51,788	60,481	443,744	296,953	385,954
" Other Countries . . . "	26,450	24,000	36,904	290,893	237,128	409,690
Total	916,070	774,855	739,060	3,844,589	3,074,176	3,241,148
Hewn: Pit props or pit wood . . .	2,321,348	2,382,577	2,120,116	2,535,365	2,485,113	2,237,746
Total of wood hewn	3,237,418	3,107,432	2,859,176	6,379,954	5,559,289	5,478,893
Sawn or split, planed or dressed.						
From Russia . . . (loads)	1,964,295	1,963,536	2,120,520	5,072,868	4,693,327	4,962,192
" Sweden	1,683,678	1,515,556	1,522,399	4,062,574	3,401,582	3,442,227
" Norway	559,596	493,932	499,127	1,550,540	1,341,531	1,303,161
" United States of America (loads)	700,257	580,701	490,632	2,308,264	1,927,894	1,696,466
" Canada	1,508,172	1,280,602	1,160,169	4,268,886	3,497,456	3,266,591
" Other Countries . . . "	328,235	231,909	192,938	929,387	644,009	583,543
Total	6,742,233	6,066,236	5,985,785	18,192,519	15,506,799	15,353,180
Staves of all dimensions	129,773	132,176	119,183	570,859	527,696	553,092
FURNITURE WOODS, HARDWOODS AND VENEERS:						
Mahogany (tons)	88,942	103,770	96,428	797,125	892,725	820,398
Other sorts	175,724	197,966	197,111	1,182,499	1,152,476	1,170,798
Total of wood and timber	—	—	—	27,122,956	23,637,985	23,376,358
Exports.						
WOOD AND TIMBER:						
Hewn (loads)	8,856	10,048	9,877	103,926	108,021	107,693
Sawn or split, planed or dressed . . .	25,301	23,071	21,753	180,220	142,801	123,214
Staves of all dimensions	7,596	6,663	8,501	60,154	38,183	79,046
FURNITURE WOODS, HARDWOODS AND VENEERS:						
Mahogany (tons)	29,782	29,095	27,327	293,014	258,474	260,074
Other sorts	9,400	10,612	15,168	95,374	93,611	118,846
WOOD AND TIMBER:						
Rough, hewn, sawn, or split, and staves (loads)	7,751	9,872	13,883	51,164	67,592	79,046
Total of wood and timber	—	—	—	733,752	708,683	767,019

THE LATE MR. JOHN BIDGOOD, B.Sc. (Lond.), F.L.S., F.R.H.S.

WE regret to announce the death of Mr. J. Bidgood, from blood-poisoning, at Bournemouth, on October 6, 1905, at the age of 52 years, where he had gone, from his home at Gateshead, to recruit his health.

The deceased was an enthusiastic member of the Scientific Committee of the Royal Horticultural Society, his horticultural and botanical researches being of great assistance to the members of the committee and

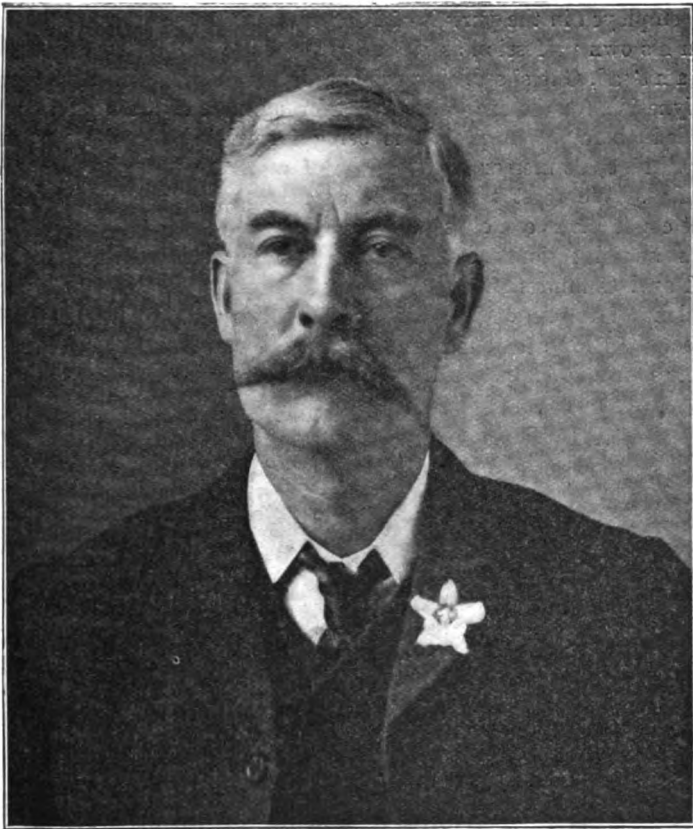


FIG. 40. THE LATE MR. JOHN BIDGOOD.

horticulturists generally. Mr. Bidgood was the discoverer of the Odontoglossum-leaf fungus *Glæosporium Bidgoodii*, recently named by Dr. Cooke, in the JOURNAL of the Royal Horticultural Society. In addition to the publication of a Text-book of Biology (Longmans) embodying a great amount of research in practical botany, Mr. Bidgood had of late been a contributor to the R.H.S. JOURNAL, the following articles

being from his pen: "Albinism in Shirley Poppies," vol. xxviii. parts 3 and 4; "Disease of the Leaves of *Calanthes*," vol. xxix. parts 1, 2, and 3; while an article on colour formation in flowers is in vol. xxix. p. 463.

It will be remembered that at the first meeting of the Society held in the New Hall of the R.H.S. in Vincent Square, Mr. Bidgood gave a lecture on "Orchids," illustrated by coloured lantern slides, made and coloured by himself from nature. It proved of great interest to orchid-growers, and was greatly appreciated by all present.

Mr. Bidgood had associated himself with the scientific, horticultural, and educational enterprises both in his own town of Gateshead and Newcastle-on-Tyne, and lecturing on subjects of scientific botany and horticulture in various districts of the counties of Northumberland and Durham. His genial manner and ever-ready advice and assistance endeared him to those employed in the pursuit of horticulture in these districts.

In his own profession as Head Master of the Secondary Day School in Durham Road, Gateshead, his work has always been held in high repute on the Tyneside, for the excellence and thoroughness of the higher education provided therein. A project is being formulated for the perpetuation of Mr. Bidgood's memory in the form of a Scholarship, which will receive his name. We trust this may be a success, as we feel sure no better object could have been chosen.

As an educational expert, Mr. Bidgood gave evidence before the first Royal Commission on Secondary Education, and had officiated as a President of the Association of Head Masters of Higher-grade Schools. Respected by his accomplished staff of assistants, and by scholars alike, his loss is most keenly felt in the North of England.

H. J. CHAPMAN, F.R.H.S.
W. H. YOUNG, F.Z.S., F.R.H.S.

EXAMINATION IN HORTICULTURE, 1906.

THE Annual Examination in the Principles and Practice of Horticulture was held on March 28, 1906, when 150 papers were sent in.

Three hundred marks were allotted as a maximum, all candidates who obtained 250 marks and upwards being placed in the First Class. The total number of these was 10, or 13 per cent. of the whole.

Those who secured 200 marks and less than 250 were placed in the Second Class. The number was 75, or 50 per cent. of the whole.

Those who obtained 100 marks and upwards were placed in the Third Class, their number being 68, or 42 per cent. Two only were not placed.

Comparing the results in percentages with those of 1905 there is a rather close agreement with last year's results, though there is a slight decrease in the total number of entries, there having been 160 in 1905 as against 150 this year.

As the old question has lately been revived, as to the *practical* value of these examinations, we would repeat that, as far as the examination is supposed to be a test of practical experience in the garden, it can only be so to a very limited extent. Therefore, before a candidate can be pronounced efficient for any position, he should also be subjected to a *viva voce* examination in a well-furnished garden; and every student should have had at least two years' practical experience.

It should be borne in mind that the value of these examinations lies in the *mental training* secured by study, and the knowledge of physiology acquired thereby; which indirectly *does* help the *practical* man, for he thereby learns how plants live, and what they require for a healthy growth and development.

We think that there should be a more careful study of the questions before answering them; as there is still much time wasted by some of the candidates in giving ideas or suggestions of their own not alluded to in the questions at all. This remark applies to a limited and; we are glad to say, a decreasing number of the candidates; but in a few instances it had had the effect of preventing the examinee from answering the full number of questions in the allotted time.

GEORGE HENSLOW.
JAS. DOUGLAS.

First Class.

	No. of Marks secured.
1. French, L., Horticultural College, Swanley	265
Damsell, G. S., University College, Reading	260
2. { Rix, E. M., Studley College, Warwickshire	260
{ Satterley, G. S., 36 Harborne Road, Edgbaston, Birmingham	260

		No. of Marks gained.
5.	Barcham, E. M. G., Essex County School of Horticulture, Chelmsford	255
	Patch, E., Horticultural School, Glynde, near Lewes	255
	Young, B. M., University College, Reading	255
8.	McLaughlin, M. J. C., Studley College, Warwickshire	250
	Sanden, G. von, Horticultural College, Swanley	250
	Tuckett, L. S., University College, Reading	250

Second Class.

11.	Cayley, D. M., University College, Reading	245
	Chambers, W., Horticultural College, Swanley	245
	Dedman, J. M., Spondon Hall Gardens, near Derby	245
	Greaves, D., Horticultural College, Swanley	245
	Heydweiller, A. P., Horticultural College, Swanley	245
	Marchetti, E. G., Horticultural College, Swanley	245
	Peters, B. M., Horticultural College, Swanley	245
	Pellow, C., University College, Reading	245
	Sims, J. C., Lynton House, Witney, Oxon	245
	Tuke, H. C., University College, Reading	245
21.	Boswell, A. d'O., Studley College, Warwickshire	240
	Cuthbertson, F. G., Essex County School of Horticulture, Chelmsford	240
	McKerrow, E., Horticultural College, Swanley	240
	Salzmann, A. L., Studley College, Warwickshire	240
	Smith, M. L., Horticultural College, Swanley	240
	Tiller, E. A., School House, Swingfield, near Dover	240
	Crisp, W. C., Lineside Cottage, Upper Vobster, Coleford, Bath	235
	Haurand, M., Studley College, Warwickshire	235
	Roberts, J. C., University College, Reading	235
	Sharland, F., Rockhurst Gardens, West Hoathly	235
27.	Turner, A., Essex County School of Horticulture, Chelmsford	235
	Burnicle, J. W., 16 The Royalty, Sunderland	230
	Capper, E. M. K., Studley College, Warwickshire	230
	Jones, J., Nant Villa, Brynamman, R.S.O.	230
	Watson, W. J., Crewe Hall Gardens, Crewe	230
	Cockin, D., Horticultural College, Swanley	225
	Eason, F., Essex County School of Horticulture, Chelmsford	225
	Eaton, J., Horticultural College, Holmes Chapel	225
	Ford, A. P., Countess of Warwick's School, Dunmow	225
	Fowle, Tom, School House, Rushall, Pewsey, Wilts	225
36.	Glenny, H., Essex County School of Horticulture, Chelmsford	225
	Hepburn, R. G., Botanic Gardens, Glasgow	225
	Marsh, J. W., Westfield Council School, Woking	225
	Moles, F., Essex County School of Horticulture, Chelmsford	225
	Orr, M. A., University College, Reading	225
	Smith, P. G. B., Canning House, Burbage, Hinckley	225
	Compton, J., Vaynol Park Gardens, near Bangor	220
	Early, A. B., Stamford House, Witney, Oxon.	220

		No. of Marks gained.
	Hodge, W. A., 18A Childeric Road, Clifton Hill, New Cross, S.E.	220
47.	Savage, A. A., University College, Reading	220
	Willoughby, E. M., Horticultural College, Swanley	220
	Dixon, C. M., Horticultural College, Swanley.	215
	Gull, H., Botanic Gardens, Glasgow	215
	Lewis, N. W., Essex County School of Horticulture, Chelmsford	215
52.	Newton, W. E., Essex County School of Horticulture, Chelms- ford	215
	Penson, G. H., Eaton Hall Gardens, Chester	215
	Poffley, A. T., 11 F Block, Peabody Buildings, Herne Hill, S.E.	215
	Watney, O. G., Studley College, Warwickshire	215
	Comrie, L. J., 8 Lauriston Park, Edinburgh	210
	Davis, S., Bryn Awel, Llwynypia, Glam.	210
	Green, J. J., The Cemetery, Hurst, Ashton-under-Lyne	210
	Ransley, A. W. C., Essex County School of Horticulture, Chelmsford	210
59.	Russell, P. H., Essex County School of Horticulture, Chelms- ford	210
	Smith, V. A., Countess of Warwick's School, Dunmow	210
	Thompson, E., Countess of Warwick's School, Dunmow	210
	Westby, W., Long Lane, Aughton, near Ormskirk	210
	Ball, F. C., 7 The Square, Llanharan-Pontyclun, Glam.	205
	Bugden, A., Weston St. Mary's, Spalding	205
67.	Errington, C. F., Countess of Warwick's School, Dunmow	205
	Oliver, G., 4 Garden Row, Aigburth, Liverpool	205
	Ritchie, W., Countess of Warwick's School, Dunmow	205
	Rose, G. H., The Gardens, Normanby Park, Doncaster	205
	Allday, M. E., Studley College, Warwickshire	200
	Batchelar, E., 80 St. Helens, Park Road, Hastings	200
	Comer, J., Countess of Warwick's School, Dunmow	200
	Davis, H. H., The Firs School Homes, Sidcup	200
	Eve, M., Horticultural College, Swanley	200
	Griffin, G., Vaynol Park Gardens, near Bangor	200
78.	Hall, T. R., The Lodge, Priory Flutte, Breadsall, near Derby	200
	Hoare, G. E., 44 Ridley Road, Forest Gate, E.	200
	Hulbert, C. E., South Bank, Swanley	200
	Matthews, A. C., Countess of Warwick's School, Dunmow	200
	May, A., Warren House Gardens, Belford	200
	Summerfield, T. A., 4 Beechmore Road, Battersea Park, S.W.	200
	Woolgrove, H., 880 Foleshill Road, Coventry	200

Third Class.

86.	Paul, B. F. H., Horticultural College, Swanley	195
	Ray, J., Floral Nurseries, Southend-on-Sea	195
	Braithwaite, H., Normanby Park Gardens, Doncaster	190
88.	Day, W. G., Galloway House Gardens, Garlieston, N.B.	190
	Gillespie, M. C., School of Gardening, Murrayfield, Edinburgh	190

		No. of Marks gained.
	Harris, James, Inverleith Park, Edinburgh	190
	Hutchin, E. H., Countess of Warwick's School, Dunmow	190
88.	Lloyd, T. F., Horticultural College, Holmes Chapel	190
	Moore, H. J., 85 Alexandra Road, Richmond, Surrey	190
	Murrell, R., Essex County School of Horticulture, Chelmsford	190
	Parker, M., Studley College, Warwickshire	190
	Barnes, A. G., 70 Upland Road, East Dulwich, S.E.	185
	Barton, R. F., Horticultural College, Swanley	185
	Goodechild, P. N., Chapel Road, Penketh, Warrington	185
97.	Mears, L. E., School of Gardening, Murrayfield, Edinburgh	185
	Munt, H. B., Charleville Park, Charleville, co. Cork	185
	Willcox, F., Horticultural College, Holmes Chapel	185
	Williams, F., 11 Lower Grove, Wandsworth, S.W.	185
	Bishop, S., The Gables, Egremont, Cheshire	180
	Jessop, T., Kilpin Lodge Gardens, Howden, E. Yorks	180
104.	Low, J., Countess of Warwick's School, Dunmow	180
	Sargeant, T., Essex County School of Horticulture, Chelmsford	180
	Wheeler, W., Essex County School of Horticulture, Chelmsford	180
	Chandler, J. M., 2 Soresby Street, Chesterfield	175
	Hudson, H. J., Peel Street, Barnsley, Yorks	175
	Medlock, H. R., 6 Market Parade, Green Street, Forest Gate, E.	175
	O'Neill, M., Church Farm, Bitton, near Bristol	175
109.	Rogers, W. H., Essex County School of Horticulture, Chelms- ford	175
	Smith, A. B., Horticultural College, Holmes Chapel	175
	Ward, J., Technical Institute, Earl Street, Coventry	175
	Whitby, G. C., Countess of Warwick's School, Dunmow	175
117.	Therkildsen, K., 16 Derby Street, Ormakirk	170
	Emery, N. A., Horticultural College, Holmes Chapel	165
118.	Hillman, M. V., Horticultural College, Swanley	165
	Salmon, K. J., University College, Reading	165
	Kent, J. H., White Hall, St. Aubins, Jersey	160
121.	Lorriman, W. H., Thorpe Common, Pontefract, Yorks	160
	Melbourn, H. S., Horticultural College, Holmes Chapel	160
	Findlay, D., School of Gardening, Murrayfield, Edinburgh	155
	Jones, E., Hawthorn Cottage, Caersws, Montgomeryshire	155
124.	Laycock, C. G., Horticultural College, Holmes Chapel	155
	McDonough, F., Polam Lodge, Darlington	155
	Miller, J., White Oak School, Swanley	155
	Gardner, L. W., Essex County School of Horticulture, Chelmsford	150
129.	Salmon, R., White Oak School, Swanley	150
	Wheeler, A., Widbury, Ware, Herts	150
182.	Harris, L. C., 198 Cross Road, Edgewick, Coventry	145
	Hight, N., Countess of Warwick's School, Dunmow	145
184.	Davies, T., Forthampton School, Tewkesbury, Glos.	140
	Marsh, A., The Barrows Garden, Tilford, Farnham, Surrey	140
186.	Neill, R. M., Norton House, Fallowfield, Manchester	135
	Wood, W. L., 6 Castle Yard, North Road, Highgate, N.	135

		No. of Marks gained.
	(Alder, G. R., Essex County School of Horticulture, Chelmsford	180
188.	{ Eddie, A. M., Glenapp Castle Gardens, Ballantrae, N.B. .	180
	{ Isherwood, F., 72 Elizabeth Street, Hurst, Ashton-under-Lyne	180
	{ Stobo, J., Pinhay, Lyme Regis	180
	{ Bradley, M. A., Countess of Warwick's School, Dunmow .	125
142.	{ Fenton, D. A., Countess of Warwick's School, Dunmow .	125
	{ Lewis, W., Essex County School of Horticulture, Chelmsford	125
145.	{ Clarke, V. E., Countess of Warwick's School, Dunmow .	120
	{ Adlam, G., Old Netley, Hound, near Southampton . .	105
146.	{ Englefield, G., 28 Crooked Billett, Wimbledon . . .	105
	{ Macintosh, H. B., Horticultural College, Holmes Chapel .	105

EXAMINATION OF SCHOOL TEACHERS IN COTTAGE AND ALLOTMENT GARDENING.

APRIL 11, 1906.

WE are glad to be able to report the greatly improved nature of the replies furnished by the candidates generally. Several of them, on the present occasion only in the lower classes, give good promise of much better work next year.

A few candidates still persist in writing on both sides of their paper. This fault must be corrected in future. Some others took too much pains to produce such elaborate penmanship as only conduces to the waste of valuable time. Occasionally disposition was shown to wander away from the subject-matter of the questions. This practice also wastes time, and has no value; rigid adherence to the subject-matter of the questions is best. Whilst full liberty is granted to candidates to take questions in any order, those who take them in the order as presented inspire confidence in their capacity. Jumping backwards and forwards amongst the questions naturally leads to the inference that candidates lack the needful general knowledge.

Proper use of certain common "terms" in gardening should have attention. The term "planting" applies to plants or potatoes. Seeds should be referred to as "sown." Several candidates stumbled over the term "herbaceous," using carnations, pansies, and other evergreen plants as illustrations. Terms of this description are intended to reveal candidates' knowledge of plant natures, or otherwise.

Speaking generally, the replies to the question on "salads" were the weakest, various things, including flavouring herbs, not salads at all, being often included. Wider knowledge as to the proper cultivation and selection of kinds and varieties for cottage garden or allotment purposes is much to be desired. Some manures recommended—product of book or class study—were hardly such as cottagers can obtain. Full consideration should always be shown to accessibility.

Finally, we note with pleasure the very admirable evidence of cultural knowledge shown by those candidates whose names stand high in the list. In such cases there was ample evidence that not mere book or class acquirements but undoubted practical knowledge was displayed. Candidates should, in their replies, always seek to be concise, clear, and practical. Profusion of words more often hides and confuses the information sought to be conveyed.

JAMES HUDSON, V.M.H.
ALEXANDER DEAN, V.M.H.

July 1906.

First Class.

1. Brewer, G. W. S., Cirenside, Charlton Kings, Cheltenham.
2. Smith, A., School House, Southwick, Trowbridge.
3. French, L., Horticultural College, Swanley.
4. Potter, F. A., 87 Knox Road, Wellingborough.
5. Mosedale, F. W., 268 Edward Street, Nuneaton.
6. Saddler, S., Holmleigh, Wellingboro' Road, Rushden, R.S.O.
7. Tiller, A. E., School House, Swingfield, Dover.
8. Burrows, T. E., Carlisle Lodge, Harbury, Leamington Spa.
9. Harrison, W., County Technical School, Stafford.
10. { Abercrombie, I., Horticultural College, Swanley.
Jones, J., Council Schools, Brynamman, Carmarthenshire.
McKerrow, E. M., Horticultural College, Swanley.
13. Greaves, D., Horticultural College, Swanley.
14. Fendick, J. S., School House, Littleport, Isle of Ely.
15. Phillips, F., Ivy Lodge, Rhyl.
16. { Ager, J. A., School House, Kilndown, Goudhurst, Kent.
Belcher, L. J., Essex County School of Horticulture, Chelmsford.
Dixon, J. R., Park Villa, Arundel Road, Ryde.
Jones, R. W., Council School, Neston, Chester.
Morris, H. J., Gordon Villas, Alvaston, Derby.
21. { Moore, W. C., Essex County School of Horticulture, Chelmsford.
Taylor, J. H., 9 Berry Street, Greenfield, Oldham.
23. { Morris, M. C., School House, Hildenborough, Tonbridge.
Sidwell, J. W., Fenny Compton, Leamington Spa.
25. { Gray, R., Stannington National School, Sheffield.
Knight, R. A., School House, Hoo, Rochester.
White, G. J., Kirkby Malzeard, Ripon.
28. Burnicle, J. W., 16 The Royalty, Sunderland.
29. Hayter, F., St. Mary's Boys' School, Witney.
30. Pidgeon, A. J., County Technical School, Stafford.
31. { Jones, J. W., Pentre Celyn Schools, Ruthin.
Thorn, J., Draycot School, Cheddar.
Watkins, W. L., Knighton-on-Teme School, Tenbury.
34. Burrows, E., County Technical School, Stafford.
35. Atlay, T. W., Hilmarton, Calne.
36. Lyons, T., Belmont School, Hereford.
37. Perks, J., School House, Orleton, Hereford.
98. { Axton, H. E., School House, Woodchurch, Birkenhead.
Davis, H. H., The Firs School Homes, Halfway Street, Sidecup.
Hudson, E., Delph, Oldham.
Matthews, S. J. C., Council School, Meare, Glastonbury.
Samuels, A., School House, Linton, Cambs.
Sinclair, A. B., Up-Holland, Wigan.
Tyson, J., School House, Ulpha, Broughton-in-Furness.
Waterfall, A., Hartington, Buxton.
Young, J., Shoscombe, Bath.

Second Class.

47. Ford, R. E., 21 St. Fillan's Road, Catford, S.E.
48. Fendick, J. S., Middlesex County School of Gardening, Harrow.
49. { Botterill, J. F., Nash School House, Stony Stratford.
Bugden, A., Weston St. Mary's, Spalding.
Forshaw, I., School House, Covenham St. Mary, Louth, Lincs.
Taylor, E. E. G., Middlesex County School of Gardening, Harrow.
53. Walker, J., Langford, Lechlade, Glos.
54. Clavey, T., School House, Burton Dassett, Leamington.
55. Pyrah, T., Middleton, Saxmundham.
56. Redhead, W., Broughton Beck School, Ulverston.
57. { Lea, J., Kinderheim, Lewis Road, Sutton, Surrey.
Ward, J., Technical Institute, Coventry.
59. { Allen, B., Tovil School, Maidstone.
Shrewsbury, W., County Technical School, Stafford.
61. { Bond, E., Welton School, Daventry.
Chambers, J., Benhall School, Saxmundham.
Cook, T. H. P., Biggin, Hartington, Buxton.
Ellis, W. R., Slimbridge, Stonehouse, Glos.
65. { Eldred, C., Sunnyside, Gainsboro' Road, Sudbury.
Hewitt, T. D., County Technical School, Stafford.
67. Bailey, R. A., Castleby, Peterston-super-Ely, Cardiff.
68. { Forse, C. R., County Technical School, Stafford.
Matthews, G. C., Endowed School, Bredwardine, Hereford.
Northcombe, W., School House, Winsham, Chard.
Taylor, J., Farmor's End Schools, Fairford, Glos.
72. Graham, T. G., County Technical School, Stafford.
73. { Hopewell, C. E., 145 Pepys Road, New Cross, S.E.
Mellor, A., County Technical School, Stafford.
75. Brazington, G. H., The Leys, Chipping Norton.
76. { Brown, C., Lower Exley, Halifax.
Hampshire, D. W., Stalmine British School, Poulton-le-Fylde.
Taylor, F. W., County Technical School, Stafford.
79. { Harrold, A., County Technical School, Stafford.
Page, C. E. H., Middlesex County School of Gardening, Ealing.
Webster, E. D., Essex County School of Horticulture, Chelmsford.
82. { Ackerman, C. I. P., Nuneham Courtenay, Oxford.
Merriman, J., Blackford School, Wedmore, Weston-super-Mare.
Saunders, W. A., Crowmarsh Schools, Wallingford.
85. { Fassnidge, J. H., Middlesex County School of Gardening, Harrow.
Rowles, J. W. A., School House, Staunton-on-Wye.
Worth, J., Herne National School, Canterbury.
88. { Canham, F. C., Wing National School, Oakham.
Davies, R. H., Council School, Orcop, Hereford.
90. { Potts, W. H., Allandale, Dudley Road, Sedgley.
Thorne, W., Babraham School, Cambridge.
92. { Broadbent, B., Benwick, March, Cambs.
Higgins, W., County Technical School, Stafford.
Oswald, M. E., County Technical School, Stafford.

95. { Allott, W., Skidby, Hull.
 Boulter, W. H., Stockton, Rugby.
 Blackman, C., Tunstall, Suffolk.
 Byas, A. L., Theberton School, Leiston, Suffolk.
 Carswell, E. M., Middlesex County School of Gardening, Ealing.
 97. { Good, W., Overton Terrace, Kilmalcolm, Renfrewshire.
 Harvey, A. R., High View, Eastergate, Chichester.
 Lewis, G., Grimoldby School, Louth, Lincs.
 Lewis, W. H. C., Feering School, Kelvedon.
 Watson, C., Cowlinge, Newmarket.

Third Class.

105. Heyes, T. H., 82 Hart Street, Ulverston.
 106. { Barnes, T., Middlesex County School of Gardening, Harrow.
 Cheek, J. E., National School, Axbridge, Somerset.
 108. Bonnick, C., 50 New Street, Coventry.
 109. { Salt, A., County Technical School, Stafford.
 Wilson, E. E. I. M., Middlesex County School of Gardening, Ealing.
 111. { Day, T., Middlesex County School of Gardening, Harrow.
 Thompson, J. K., North Sunderland Sch., Chathill, Northumberland.
 113. Humphries, J. B., County Technical School, Stafford.
 114. Brook, J., School House, Allensmore, Hereford.
 { Hunt, A. R., Essex County School of Horticulture, Chelmsford.
 115. { Leak, F., Beadnell, Chathill, Northumberland.
 Truscott, J., Bugle School, St. Austell, Cornwall.
 { Ashton, A., Essex County School of Horticulture, Chelmsford.
 118. { Knowles, T. A., School House, Fritwell, Banbury.
 Wayman, B. W., Middlesex County School of Gardening, Ealing.
 { Gladwyn, F. F., Westleton, Saxmundham.
 121. { Oswald, W., County Technical School, Stafford.
 Wyatt, E. H., Sheep Street, Burford, Oxon.
 124. Sidwell, W. T., 141 Clifton Road, Rugby.
 { Crooks, W., Biggin Hill, Westerham.
 125. { Stenning, A., Friston, Saxmundham.
 Stephens, F. W., Endowed School, Aldridge, Staffs.
 128. Dalkin, C. J. T., 8 Friarage Avenue, Northallerton.
 { Bowden, B. C., County Technical School, Stafford.
 129. { Dean, A. J., School House, Eastnor, Ledbury.
 Jones, G. A., National School, Newton, Sittingbourne.
 { Giles, R., 19 Sefton Villas, Ryelands Street, Hereford.
 132. { Smith, T., School House, Wood-Ditton, Newmarket.
 Soppitt, H. P., Middlesex County School of Gardening, Ealing.
 { Whittle, J., County Technical School, Stafford.
 136. { Coates, R. T., Lord Scudamore's School, Hereford.
 Pollitt, A. W., Manor House, Ince, Chester.
 138. Higgens, T. F., School House, Kidmore End, Reading.
 139. Carr, J. W., Embleton, Christon Bank, Northumberland.
 140. Braham, R. G., Middlesex County School of Gardening, Ealing.

- 141. { Chitty, G., Middlesex County School of Gardening, Ealing.
 Fowle, T., School House, Rushall, Pewsey, Wilts.
 Hudson, H., Wes. School, Greenfield, Oldham.
 Huke, E. T., 139 Queen's Street, Rushden.
- 145. Burnett, G., National School, Cheddar.
- 146. { Holgate, J. C., Ellingham School, Chathill, Northumberland.
 Holmes, W. M., Duncton School, Petworth.
 Vowles, J., Bagley Close School, Wedmore, Weston-super-Mare.
 Winchester, R. B., School House, Treales, Kirkham, Lancs.
- 150. Wilkes, J. B., County Technical School, Stafford.
- 151. Rapson, M. A., Burford, Oxon.
- 152. { Amys, C. E., School House, Aldingbourne, Chichester.
 Bellringer, F. E. J., Middlesex County School of Gardening, Ealing.
 Oldham, G. C., School House, Sandhurst, Berks.
 Reeve, W. R., Middlesex County School of Gardening, Ealing.
 Winchester, J., Blue School, Newton, Kirkham, Lancs.

EXAMINATION IN COTTAGE AND ALLOTMENT
GARDENING, APRIL 11, 1906.

THE Examiners in this examination suggested that it would be very useful to future candidates to publish a specimen of the answers given by one of the most successful candidates; therefore one of their papers has been given. It should be borne in mind that it is printed *exactly* as given in, without any correction whatever, or comment, except that, notwithstanding any blemishes which may be detected, the Examiners consider it a most excellent paper for any candidate to have written.

EXAMINATION IN COTTAGE AND ALLOTMENT GARDENING,
WEDNESDAY, APRIL 11, 1906.

Read this first, carefully.

Three hours are allowed for this Paper. Eight Questions at least must be answered, and conciseness and terseness will be acceptable. The sheets of paper on which the Questions are answered must be pinned together securely in their right order. Each paper of Questions given out bears a different number, and the Candidate must write that number distinctly on the top of every sheet of paper he hands in. He must also write his name and address privately to the Society in an envelope which will be given out for the purpose with each paper of Questions.

1. Give details briefly as to the proper times and methods for sowing Onion seed out of doors in the garden, and under glass in winter; name a few good varieties for the various seasons.
2. Mention several common varieties of Winter Greens, and give the best times and methods of sowing the seeds to secure a long succession.
3. Describe the preparation of ground for Scarlet Runner Beans; the best time and method of sowing the seeds, staking the plants, and general cultivation; name two or three good varieties.
4. Give a list of six varieties of Potatoes for garden or allotment; name their seasons, whether early or late; give the proper distances for planting, and some information as to general cultivation.
5. Explain the proper methods of raising Tomato Plants from seed, their cultivation in pots or boxes in a greenhouse, or planted out of doors in the open ground or against fences or wall. Mention two good varieties for either purpose.
6. Name six of the most suitable kinds of salading for a cottage or allotment garden, consideration being given to an extended season of supply. Indicate the methods of cultivation best suited to each kind.
7. Describe Bush Fruits; what they are, how generally cultivated, the best and most economical situations. Name a few good varieties of each.
8. Describe a few of the insect pests that infest Apple trees, and how these may be most effectually overcome.
9. Mention a few suitable Roses for training over arches, fences, or cottages; also describe diverse forms of garden Roses, *i.e.* how commonly designated. Give remedial measures for Aphis and Mildew.

10. Name six of the most suitable kinds of Bulbous flowering plants for a cottage or allotment Flower garden. Describe their cultivation and general treatment.

11. Describe briefly the cultivation of Sweet Peas ; of Sweet Williams ; of Carnations ; and of Michaelmas Daisies.

12. Describe :

1. What is a Hardy Annual ? Give six examples of diverse kinds.
2. What is a Half Hardy Annual ? Give three examples of diverse kinds.
3. What is a Hardy Biennial ? Give three examples of diverse kinds.
4. What is a Hardy Herbaceous Perennial ? Give six examples of diverse kinds.

PAPER BY CANDIDATE.

QUES. 1.—Onions are usually classed as being either Autumn or Spring sown. Until the last few years the chief onions sown in autumn were of the Tripoli class of which Giant Rocca is a good type. These autumn sown onions were for use in the summer and early autumn after being sown. The spring sown onions on the other hand were of a hardier nature, and were for use during the winter & spring after being harvested. It has however been found that varieties like Ailsa Craig, Cranston's Excelsior &c do well if sown in autumn & transplanted in the spring. So treated they produce large bulbs which will keep well & much longer than Tripoli onions.

The land for onions should be rich & have been deeply trenched & heavily manured with well rotted farmyard manure some months in advance. The soil requires to be made firm by treading or rolling & this should be done when the soil is dry. The planting too should be done when the surface is dry.

Autumn sown onions may be sown from early in August to the end of September. The spring sown onions may be sown from March to April. The seeds should be sown in drills 1 inch deep, the rows being 12 inches or rather wider apart. The seed should be lightly covered with fine soil. When the seedlings appear of spring-sown onions they should be constantly thinned until the plants are from 6 to 8 inches apart in the rows. Autumn sown onions may be thinned in spring & transplanted early in March into rows about 1 ft apart, the bulbs being 6 or 8 inches distant from each other. As regards sowing under glass the seed should be sown about the second week in January. The seed should be sown in a box or pan & covered with about $\frac{1}{2}$ inch of soil. Cover the seed with a piece of glass until the seedlings appear. They should not be grown in too great heat. A cottage window or a cold frame will often answer the purpose. As soon as the seedlings are well above the soil they should be pricked out into other boxes. The young plants should be well hardened off before planting out of doors midde of April. When the plants no matter whether autumn or spring sown are fairly started into growth the ground should be constantly stirred with the hoe. Where exhibition

onions are required a good mulch of stable litter is often applied. Soot & lime are beneficial to onion crop & may be applied to the ground at the time of planting. Where the onion maggot is at all prevalent, either autumn sown onions or else onions raised under glass should be the ones grown. For varieties Ailsa Craig, Cranston's Excelsior, Jame's Long Keeping & Bedfordshire Champion are all good for spring sowing, whilst Ailsa Craig, Cranston's Excelsior, Giant Rocca and Red Tripoli are suitable for autumn sowing.

QUES. 2.—*Brussels Sprouts*.—*Sutton's Earliest of All* may be sown under glass or in a cold frame about the middle of March for early crop.

Wroton Brussels Sprouts.—This variety may be planted out of doors about the first or second week in April for general crop. A final sowing may be made the last week in April for latest crop.

Savoy.—*Sutton's Earliest of All* may be sown out of doors the last week in March or first week April whilst *Green Curled Dwarf* may be planted out of doors 10 days later.

Kale.—Scotch Kale (Curled) Cottager's Kale & Asparagus Kale & Green Curled Kale are all useful winter greens & the seed should be sown early in April.

Flowering Brocoli.—Purple Sprouting Brocoli, White Sprouting Brocoli, & Ledsham's Latest of All Brocoli are also important winter greens especially the first two above named. These may be planted from the second week in April to the end of the month.

Turnip greens forms another useful winter green. Turnips are sown after potatoes during August or early in September. Left in the ground a plentiful crop of greens is produced in spring when green vegetables are scarce.

As regards the planting of the above greens. The soil for either of the plants should be rich, deep & should be made firm—an open & exposed position for all but the earliest sowings being an advantage as thus sturdy plants are produced. The seed should be very thinly sown. The beds should be well pulverised & surface soil fine & as soon as the seedlings are large enough to be handled should be picked out singly into nursery beds 6 inches apart and should be planted out into their permanent quarters as early as possible. It is better to sow the seed in rows than broadcast. Lime and soot are beneficial to the seedlings.

QUES. 8.—*Runner Beans* to produce large crops should be planted in deep rich soil, which had been previously trenched or double-dug. A little salt & soot incorporated with the soil is considered by some beneficial. The seeds may be sown in rows in that case the seed should be 6 inches apart, or in circles, but in the latter case the beans should be planted 6 inches apart. For early crop plant the first week in May

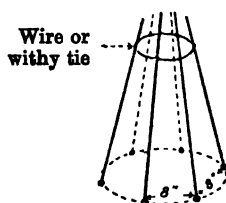


& then the beans would be better planted in trenches about 5 inches deep. It is thus early to protect the tender plants from cold winds or

frosts. The main crop may be planted a week to a fortnight later. If rows are planted poles about 7 feet high are required for sticking & these can be tied to a cross pole & thus all made firm & secure. If



more than one row is required the rows should be 6 to 8 feet apart. Some prefer to plant in circles thus placing a pole for each bean. These



should be 6 to 8 inches apart. The dots represent beans. In that case about three feet from circle to circle should be allowed.

As regards varieties Scarlet Runner, & the Czar are good, the latter being a white variety. It is advisable to plant a few extra beans in case of failure of any in the rows so that these places may be filled. The after treatment of Runner Beans consists in seeing that the plants have plenty of moisture if the weather be very dry, When the plants have reached the tops of poles to pinch out the heads. When beans are ready for picking they should be constantly picked over and thus the continuance of the crop and the tenderness of the beans may be improved. If seed is required then a few beans should be left for that purpose selecting some of the finest & longest pods for the purpose. The seed beans it would be well to keep on plants from which beans are not much picked.

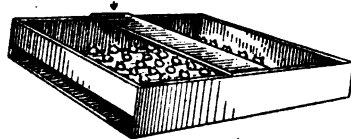
QUES. 4.

Variety	Season	Distance of Planting	
		Rows apart	Tubers apart in row
Early Puritan . . .	Early	2 feet.	1 foot.
Sharpe's Victor . . .	Early	2 feet.	1 "
Windsor Castle . . .	Second Early	2 ft. 6 inches.	1½ feet.
British Queen . . .	"	2 ft. 6 ins.	" "
Up-to-Date . . .	Main Crop	2 ft. 6 ins.	" "
Duchess of Cornwall .	" "	3 feet.	1½ feet.

Cultivation.—Ground for potatoes should be deeply dug & carefully manured. The manure may be dug in with the potatoes. Tubers for seed should be of medium size and should be perfectly sound. The seed should have been placed in shallow boxes with the eyes upwards early in the year so as to produce strong sturdy chits. The potatoes should be placed in a light airy position protected from frost and should be ready

for planting by the end of March or early in April. It is an advantage to get the tubers in the ground during April at the latest. There are

Handle



SEED POTATO BOX

various methods of planting. If ground has been previously dug & manured, *dibbling* them in is often resorted to but in that case care is necessary not to break off the chits. Some draw drills whilst others dig out trenches & plant thus.

The after treatment consists of well hoeing between the rows after the tops have come through & before the potatoes are ready to be earthed up. The earthing up may be done at twice. Opinions differ as to whether it is better to draw earth up closely to the potato stems or leave flat on the top.



Probably drawing the earth close is the better method as the spores of disease are not so likely to be washed into the roots. To prevent disease spraying or dusting with Strawsonite or other preparation is a good plan. In case this is done the plants should be sprayed or dusted from mid June to at intervals of two or three weeks. Early potatoes do not need spraying to such an extent.

After digging the potatoes should be sorted, & placed thinly on the ground so that they may be well dried and matured before being stored.

Ques. 6.—Six of the most suitable kinds of salading for growing in a cottage or allotment garden are as follows :

Horse Radish.—This useful salad is generally grown in an out-of-the corner of the garden but deserves more attention than is generally given it. The usual method is to make a hole with a crowbar 8 to 12 inches deep & to place in this a crown with the eyes round the top rubbed off. This method however takes some years to produce satisfactory results. A better method would be to make a trench in autumn 2 feet wide at the



base, the top being about 6 or 7 inches across. The young stems of horseradish might be placed in obliquely taking care to see that only the

top shoots are left in. During the winter the horseradish may with advantage be fed with liquid manure. Horseradish is used throughout the winter months & perhaps may be looked upon more as an appetiser than a salad.

Radishes are commonly grown, the first sowing being made early in February in a warm border, which has been carefully prepared for the reception of the seed. Radishes should be quickly grown and should never be allowed to stop growing through drought. Sowings may be made at intervals throughout the spring & summer months. French Breakfast Radish is good for early work, whilst the Turnip & Long Scarlet varieties are good for later work.

Lettuce is perhaps the salad above all others that is grown in all kinds of gardens. Small patches may be sown at intervals from March till September out of doors, at intervals of 2 or 3 weeks. The last sowings should be of hardy kinds like Hammersmith, Hardy Cos &c., & these should be pricked out in spring for use during April & May. The early sowing in a warm border would be ready a few weeks later. The seed bed requires to be carefully made & the plants want much moisture. The Cos varieties must be tied to blanch the hearts.

Tomato is a favourite. Unless one has the use of a small greenhouse or a hot bed it is best to purchase the young plants, selecting those only which are sturdy (but with tender looking rather than woody stems). The young plants should be placed in as sunny a position as possible, &c. For further details see answers to question 5. Tomatoes form a most useful salad in autumn.

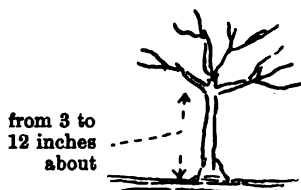
Mustard & Cress has the advantage that it can be raised practically at all times during the year. Indoors in the winter in a box or pan wherever there is a window handy & frost can be excluded. Outdoors from March onwards. The seed should be sown very thickly, the mustard being planted a few days later than the cress, as it grows quicker. The seed should not be covered with soil, & the soil should be moist. Cover with a sheet of glass which can be removed when the seedlings appear.

Celery is raised in heat in March, in boxes or pans, the seedlings being pricked out, three or four inches apart as soon as they can be handled. They are hardened off in a cold frame and planted out during the summer months (June especially). Early crops should not be encouraged, as celery is not fit for use before Sept or Oct. The ground for celery should be deeply dug & very heavily manured, & should be made into trenches. The plants require copious waterings, & as soon

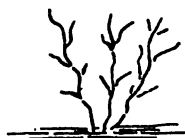


as sufficiently grown should be earthed up to blanch. This useful salad is useful for autumn & winter use.

QUES. 7.—Bush Fruits proper include Black, White, & Red Currants & Gooseberries, but of late years Bush pears & apples have been largely grown, & may now be frequently found in cottagers gardens. Bush trees are those which have no main stem (in case of Black currants) or only a short stem, & then the tree branch out thus :

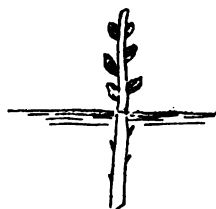


FORM OF GOOSEBERRY, APPLE, PEAR-BUSH.



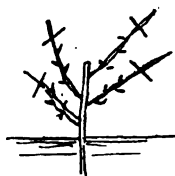
FORM OF BLACK CURRANT.

Gooseberries & currants may be easily raised from Cuttings which should be of well ripened wood of last year's growth, slipped from the tree or else cut & from 10 to 12 inches long. Having selected the cutting cut off the top, leaving about 4 shoots, trim off the others except in the case of black currants, which should have these left on.



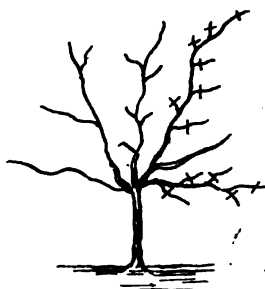
GOOSEBERRY CUTTING.

Plant the cuttings in a nursery bed a few inches apart. When the cuttings have made root transplant to a bed which has richer & deeper soil. The cuttings may be taken in the autumn when the bushes are pruned. The first year the young bush should be pruned back to 4 or 5 eyes, and next year the bush should be pruned so as to take



its permanent form. In the autumn of the second year the bushes may be transplanted to their final quarters. In planting care should be taken to make big enough a hole, so that the roots may be properly spread out in their proper layers & not cramped up. The hole might be dug deep & good rich soil incorporated. The bush should be firmly planted, & a mulching of manure might be spread around the bush. Gooseberries & currants bear their fruit in the new wood, and also in wood of 1, 2, 3 or more years old therefore the pruning must be undertaken with a view to thin out the bush (hardly anything wanted to be done in

case of black currants). Red Currants & Gooseberries need the tips of their branches cut off & the side shoots cut back to a couple of eyes.



Out off laterals
where crossed.

PRUNING OF BUSH, CURRANT (RED) AND GOOSEBERRY.

All decayed branches & too crowded wood should be removed. The situations mostly given to bush fruits is along the edge of a path or next to a fence. Red currants & gooseberries will do with a shady position, but of course bush trees will do best if planted where full advantage of sun & air can be obtained. That being so it is probably a good plan to plant if ground will allow the bushes in rows across the garden. Red currants will do in a north or north-east position, & thus placed some varieties will hang their fruits for a long period. Gooseberry sawfly is troublesome in some districts, & watch should be kept for its first appearance & finger & thumb impressions employed, although dressings of soot & lime sprinkled over the bushes in the morning are often employed. Apples & pears when grown in small gardens should be on dwarfing stock, & sorts which are not robust growers should be selected, such as Lane's Prince Albert, Cox's Orange Pippin for apples, Louis Bonnee, Doyenne de Comice and others for pears. For Black Currants Boskoop Giant, & Carter's Black Champion & Black Naples. For Red Currants Raby Castle, Fay's Prolific. White Dutch is mostly cultivated amongst White Currants. Gooseberries offer much choice, Keepsake, Whinham's Industry are much grown, whilst others of a dessert kind such as Champagne, Greengage are good varieties.

QUES. 9.—For Walls of cottages:—W. A. Richardson, Gloire de Dijon, Boquet d' Or. For Arches & fences, Dorothy Perkins, Crimson Rambler, Longworth Rambler, Climbing Mrs. W. J. Grant, & many others may be employed.

I am uncertain whether you require form of growth or otherwise. Form of trees may be standard, *i.e.* a stem about 8 feet to 4 feet high



FORM OF BUSH ROSE.

with a bush head, a short standard stem from 2 ft. 6 inches to 3 feet & head. Bush, when the branches rise cut of the ground. Pillar or

Climbing roses are those which have the nature of climbing, such as Crimson Rambler. Wichuriana Roses are good for trailing. If however by form is meant whether Teas &c. Roses are divided into Teas, Hybrid Teas, Hybrid perpetuals, Penzance Briers, Noisette, Polyantha, & Wichuriana.

Aphis on Roses is best combated by syringing with some noxious wash, such as quassia infusion. A good & simple remedy is a wine glass of paraffin to 2 gals of water, and a little soft soap added. This well mixed & sprayed over the tree will soon kill aphids. Abol insecticide, Tobacco water & many other things can also be used. An Abol syringe is one of the best instruments to use for spraying roses. Rubbing off with finger & thumb is often done, but if one aphid escapes there is the danger of another attack as the amazing aphid is viviparous, & therefore in a short time it is possible for a single individual to repopulate a rose tree.

With regard to mildew. This seems to be the effect of soil, situation, climate or other causes & hence no thoroughly efficient remedy has been discovered, spraying with a solution of sulphur or dusting with flowers of sulphur or green sulphur is the means mostly adopted for getting rid of mildew. Some roses are more subject to this disease than others & hence when selecting roses it would be well to bear this in mind.

QUES. 10.—Crocus, daffodils, St. Brigid Anemone, Narcissii, Hyacinths, Tulips.

Deeply dig the soil. Croci may be planted in clusters about 3 inches deep or single about 3 or 4 inches apart. Plant in the late autumn.

Daffodils may be planted in rows, or to fill designs. Perhaps the best way is in clumps. Daffodils are largely used for naturalisation i.e. planting in meadows, park like lands in corners of lawns, under bushes &c. & so treated are very fine in the spring.

St. Brigid Anemone is becoming a gradual favourite owing to its usefulness for cutting & for its splendid range of colours. Plant in the summer in a sunny position for blooming in the spring.

Narcissii are usually planted in clusters a few inches deep in not too rich soil.

Hyacinths like a fairly rich soil but no new manure should be employed. Leaf mould & decayed horse manure being best for the purpose. Plant about 4 inches deep in November.

Tulips may be used for bedding out & as such forms a welcome mass of colour when bright colours are scarce.

The after treatment consists of tying the leaves together to make beds look tidy in case of daffodils, crocus &c. & of removing the leaves when decayed. With the exception of perhaps daffodils the other bulbs are best if moved every two or three years, the bed deeply dug & fresh soil added to the bed.

QUES. 11.—Sweet Peas may be planted in the autumn but perhaps are more often planted in Feb. & March. They may be planted where required to bloom or may be transplanted. The ground should be in

good condition & have been deeply dug. The Peas like a sunny position. A little soot & lime sprinkled around the seedlings keep off slugs. Peas may be transplanted in April. To have a long succession of bloom keep well picked, & do not let seed form. Bushy, twiggy sticks are best to let the peas cling to, rather than straight sticks or canes. Peas should be stuck when 4 or 5 inches above ground.

Carnations are generally raised from cuttings or by layering, the latter being perhaps the surer method where glass cannot be used. They may also be raised from seed if planted in a sheltered position in garden during May. Layering is generally done in August. Select suitable shoots & peg these down in a small trench in the soil, add a little sand,



trim off all the leaves except a few at the top. Half cut through the shoot just below a joint; see that the cut is kept open. Water a few days after. Cuttings are prepared by taking off shoots & trimming off the bottom leaves, cutting shoot obliquely. Plant in boxes in rich soil.

Michaelmas Daisies may be raised from seed or by dividing a clump. The cultivation required is to cut down the old stems in winter & every few years take up the clumps, divide & replant in fresh soil.

Sweet Williams may be raised from seed. They may also be propagated from cuttings or by layering much like *Carnations*.

QUES. 12.—A *Hardy Annual* is a plant that may be raised from seed out of doors where it blooms & dies the same year as sown. Examples:—Candytuft, Virginia Stock, Mignonette, Shirley Poppy, Sweet Pea, Nasturtium.

Half Hardy Annuals are those plants which require to be raised in a cold frame or be otherwise protected in its earliest stage of growth & which may be transplanted to the position out of doors where it blooms & dies the same year as raised. Examples Asters, Stocks, Lobelia.

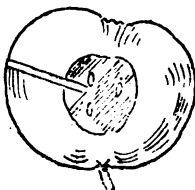
Hardy Biennial is one which is sown during part of one year to bloom & die the following year, e.g. Canterbury Bells, Campanula, Brompton Stock.

Hardy Herbaceous Perennial refers to plants raised from seed out of doors & which if properly tended will live for years, i.e. Sunflower, Michaelmas Daisy, Larkspur, Lupins, Monkshood (Aconite), Delphiniums.

QUES. 8.—There are several insect pests which attack Apple trees. The Codlin moth is on the wing during May & June & lay its eggs at the blossom end of the apple. They are hatched in a few days & enter the apple by the eye & make straight for the core upon which they feed. When full fed it emerges and if apple is on the tree it lets itself

down by a silken thread and pupates under the tree in the soil. If apple has fallen to the ground the grub crawls out and buries itself as before. The Chrysalids remain till the following spring, when they appear as moths.

Egress channel of
grub of Codlin moth



APPLE ATTACKED BY CODLIN MOTH.

Knowing something of the life history we may take steps to cope with this pest. First all apples which show signs of being grubby should be gathered from the tree if they can be conveniently reached. All fallen grubby fruit should likewise be collected. In either case this grubby fruit should be burnt. Spraying with Paris Green wash within a week of the fall of the blossom is also to be recommended. Haybands or grease bands around the trunk will also account for a number of the grubs.

Winter Moths are troublesome pests. The fact however that the female is wingless at once suggests a mode of dealing with this pest by means of grease bands. The moths are on the wing (male) during the last two or three months of the year. Spraying with Caustic Soda Wash in the winter months (Caustic soda 1 lb., Pearl Ash 1 lb., Soft Soap 1 lb., 5 gals water) is a good preventive where it can be employed. Orchard trees however require grease bands to be placed around their trunks. Cart grease put on butter paper makes a good band & special



Grease band

preparations can also be purchased. The bands should often be renewed & kept on till moths are no longer on the wing. The caterpillars feed on the leaves & even the blossom. They are known as LOOPERS. Woolly Aphis or American Blight is a most destructive pest. On trained & small bush trees it can easily be coped with. I find a camel hair brush & methylated spirits first rate—just paint over the parts affected getting well into the crevices. The Caustic Soda Wash in the winter will also do much to eradicate this pest. In the case of orchard trees not much can be done except cleaning & spraying in winter.

Mussel Scale is another insidious enemy of apple trees. Caustic Soda wash in the winter applied two or three times; afterwards scraping

clean with a blunt knife is useful. Frequent sprayings with paraffin wash to which soft soap is added is likewise beneficial. The mussel scale by taking the sap from the bark will kill fruit spurs & branches.



MUSSEL. Scale 6 x 1.

Green Fly or *Aphis* sometimes cause mischief but any Insecticide may be used to overcome this pest. A good Insecticide is Abol.

QUES. 5.—Tomato seed should be sown in boxes in February in bottom heat of not less than 50 degrees and as soon as the seedlings appear & are large enough to handle should be pricked out singly into pots which contains a compost of leaf-mould, soil, & a little silver sand. They should be kept near the glass to prevent their being drawn. The plants which need to be sturdy should be planted out in May or first week in June according to the weather. The after treatment consists in keeping lateral shoots pinched off. A stake is needed to which the young plant should be tied. When the flowers are open it is a good plan to gently tap each flower with the finger to ensure fertilisation. When fruit is set liquid manure may be occasionally applied. Holme's Supreme, Early Prolific are two good varieties.

Cultivation in a greenhouse is much the same, keeping the temperature not too high & by training to wires, to strings &c.

N.B.—In all cases above where periods of planting are given I have referred to the most suitable time as found in this district, the soil of which is of a light loamy nature with sand as subsoil.

EXAMINATION OF MEN EMPLOYED IN PUBLIC PARKS AND GARDENS.

JANUARY 11, 1906.

THE Council of the Royal Horticultural Society consented to hold this examination, at the suggestion of certain public authorities charged with the administration of the public parks and gardens of this country, who desired to obtain some independent and competent test of the relative knowledge possessed by the men they employed.

The examination was partly written and partly *viva voce*, and occupied three hours and twenty minutes in all. It was held in the Society's Great Hall in Vincent Square, Westminster.

Ninety candidates entered their names, and of these only one was absent; but another was taken ill during the course of the examination and was obliged to resign.

Speaking generally, the answers, both written and *viva voce*, revealed a distinctly remarkable absence of observation and thought, combined with by no means too high a degree of ordinary education. Most of the candidates appeared to possess a rough and elementary knowledge of the subjects inquired of, but were unable to give expression to their ideas in coherent and intelligent language. This may be accounted for, perhaps, by the fact that it was, to the great majority, their first experience of an examination, and many of them showed evidence of a quite unnecessary degree of nervousness.

The examiners have given credit wherever possible for good intentions, and regret that, even so, they are unable to include more names in the class list.

The examiners desire to impress on the candidates the absolute necessity of observation as they pursue their daily work, and the application of thought as to the why and the wherefore of what they do and what they notice. A man can never be really fit for high place in any calling in life unless he both thinks and observes. Rules are good, but only so long as they lead to the inquiry as to why in each case they should be followed, and what effect they are intended to produce.

The examiners urge the unsuccessful candidates not to be disheartened by failure in their first attempt, but to set themselves carefully to observe the things about them, and to think out for themselves the reasons of their different operations. Twelve months of this, coupled with inquiry from their superiors on points which seem difficult to fathom, will probably result in their success at the next or at some subsequent examination.

The examiners notice with regret that they have felt obliged to disqualify one candidate for evident copying.

WILLIAM CRUMP,	} <i>Examiners.</i>
C. R. FIELDER,	
GEO. NICHOLSON,	
OWEN THOMAS,	
EDWARD WHITE,	
W. WILKS,	

DIVISION A.

Class I.

1. Dance, Montague William, Abbots Ann, Andover.

Class II.

2. Barnes, Arthur George, 1 Gassiot Road, Tooting, S.W.
3. Warren, C. J., 64 Chertsey Road, Tottenham, N.
4. { Parrott, C., Spring Hill Cottage, Upper Clapton, N.E.
Venables, R., 32 Bertram Road, Enfield, N.

Class III.

6. Pogmore, C., 18 Kingston Road, Leytonstone.
7. Marshall, James, 55 Finchley Road, Kennington, S.E.
8. Hentsch, Frederick, Rosary Lodge, Battersea Park, S. Lambeth.
9. Philp, F. J., Park Cottage, Myatt's Fields, Camberwell, S.E.
10. Smith, John G., 814 Camberwell New Road, Camberwell, S.E.

DIVISION B.

Class I.

1. Prince, Alfred, Brookwell Park Lodge, Herne Hill, S.E.
2. Summerfield, T. A., 4 Beechmore Road, Battersea Park, S.W.
3. Blain, Albert, 62 Perth Road, Stroud Green, N.
4. Harber, Henry, 48 Spencer Road, Herne Hill, S.E.
5. Buckingham, Wilfred, 10 Oakford Avenue, Sydenham, S.E.

Class II.

6. { Cockram, Vincent, 18 Heathwood Gardens, Old Charlton, Kent.
Hartless, A. J., 46 Wingate Road, Hammersmith, W.
8. { Lewis, J. W., 10 Dairsie Road, Well Hall, Eltham.
Stroud, Clement, 8 Morpeth Road, South Hackney.
10. Poffley, A. T., 107 Durban Road, Auckland Hill, West Norwood.
11. Williams, F., 11 Lower Grove, St. Ann's Hill, Wandsworth, S.W.
12. Waterman, Frederick J., 69 Moring Road, Upper Tooting, S.W.

Class III.

18. Strong, Joseph, 27 Brailsford Road, Tulse Hill, S.W.
14. { Groom, C. G., 32 Castle Street, Battersea, S.W.
West, W. H., 207 Dunstan's Road, East Dulwich, S.E.

16. Edwards, J. H., 18 Heather Road, Burnt Ash Hill, Lee, S.E.
17. { Gibson, Pierre, 16 Magdala Road, Highgate, N.
Sheppard, Alfred Charles, 18 Glenwood Road, Tottenham, N.
19. { Argent, Stephen, 42 Three Colt Street, Limehouse, E.
Butcher, P. G., 8 Coburg Road, Wood Green, N.
21. { Black, Ronald, 81 Bowerdean Street, Fulham, S.W.
Nile, G., 112 High Street, Eltham, S.E.
23. { Barrett, F. W., 46 Mount Ash Road, Sydenham, S.E.
Palmer, Wm. Stevens, 25 Mount Pleasant Road, Finsbury Park, N.
25. Duncan, Geo., 31 Rowland Grove, Upper Sydenham, S.E.
26. { Dixon, F. C., 10 Dairsie Road, Well Hall, Eltham.
Hall, J. H., 28 Bridge Road West, Battersea, S.W.
Schulze, F. W. Otto, 22 Milton Road, Herne Hill, S.E.
Vyse, J. W., 2 Coombe Road, Wells Road, Sydenham.
30. Troke, A. J., 7 Crewys Road, Childs Hill, N.W.
31. { Spencer, Walter, 59 Rathcoole Gardens, Hornsey, N.
Weston, Robert J., 18 Gibbon Road, Nunhead, S.E.
33. Gilbert, Frank, Victoria House, Old Road, Gravesend.

EXAMINATIONS IN HORTICULTURE, 1907.

SYLLABUS OF THE GENERAL EXAMINATION, APRIL 10; SCHOOL TEACHERS' EXAMINATION, APRIL 24; PUBLIC PARKS EXAMINATION, JANUARY 14.

I.—GENERAL EXAMINATION, WEDNESDAY, APRIL 10, 1907.

1. The Council of THE ROYAL HORTICULTURAL SOCIETY, sympathising with the efforts of various County Councils, Technical Institutes, Schools, Gardeners' Mutual Improvement Societies, and other bodies to promote instruction in Practical Horticulture by means of Lectures, Demonstrations, &c., and in the hope of rendering such teaching more definite and effective, have consented to hold an Examination in Horticulture on Wednesday, April 10, 1907.

2. The following is an outline Syllabus, showing the nature of the subjects to which it is considered desirable that the attention of Students should be drawn.

ELEMENTARY PRINCIPLES ON WHICH HORTICULTURAL PRACTICE IS BASED.

(1) Soils, good and bad: their Mineral Composition; Chemical Nature of Fertilisers and their respective values.

(2) The Physiological values of Water, Heat, and Air in Plant Growth.

(3) The Structure of Seeds and their Modes of Germination; the Chemical Phenomena of Germination; the Movements of Seedlings and the Uses of them.

(4) The Functions of Roots; their Anatomical Structure; Hindrances to Healthy Root-action and their remedies.

(5) The Uses of Stems and Branches; the Anatomical Structure of an ordinary Dicotyledonous and of a Monocotyledonous Stem.

(6) The Physiological Functions of Leaves, and the Action of Light upon them.

(7) The Structure of Tubers and other Subterranean Stems; the Structure of Bulbs and Buds; the General Phenomena of Vegetative Multiplication.

(8) The Physiological Processes undergone in Growth and Development; the Structure of an Active Cell, and the Process of Cell-division and the Formation of Tissues.

(9) The Structure of Flower-buds and of Flowers; the Methods of Pollination, Natural and Artificial.

(10) The Process of Impregnation of the Ovule, and the Formation of Embryo and Endosperm.

(11) The Classification and Description of Fruits; the Changes and Development during Ripening.

(12) The General Characters of the Commoner Families of Plants in Cultivation.

(13) The Origin of Species.

HORTICULTURAL OPERATIONS AND PRACTICE.

(1) Surveying and Landscape Gardening: Elements of.

(2) Choice of Site for Garden.

(3) Description and use of Implements under each head.

(4) Operations connected with the Cultivation of the Land, with explanations and illustrations of good and bad methods; Digging and Trenching; Draining; Hoeing, Stirring the Soil, and Weeding; Watering; Preparation of Seed Beds; Rolling and

Raking, Sowing, Transplanting and Thinning; Potting, Planting; Aspects, Positions and Shelter; Staking; Earthing and Blanching, &c.

(5) Propagation, Elementary Principles: Cuttings, Buddings and Grafting, Stocks used, Layering, Division, Branch Pruning, Root Pruning; Old and Young Trees and Bushes. Training.

(6) Fruit Culture; Open Air and Under Glass; Small Fruits; Apples and Pears; Stone Fruits; Gathering and Storing; Packing and Marketing. General Knowledge of Fruits, and Selection of Varieties.

(7) Vegetable Culture: Tubers and Roots; Green Vegetables; Fruits and Seeds; Rotation of Crops, and Selection of Varieties.

(8) Flower Culture, Outside and Under Glass.

(9) Manures and their Application.

(10) Improvement of Plants by Cross-breeding, Hybridisation and Selection.

(11) Arboriculture: Trees and Shrubs and their Culture.

(12) Insect and Fungus Pests; Prevention and Treatment.

BOOKS RECOMMENDED FOR STUDY.

3. Students and young gardeners not having had the advantage of attending Lectures, but wishing to present themselves at some one of the Centres for Examination, might with advantage consult some of the following works:—

"Agricultural Botany," by John Percival, F.L.S. (Duckworth, 3 Henrietta Street, W.C.), 7s. 6d.

"Manual of Agricultural Botany," by Dr. A. B. Frank, translated by J. W. Patterson (Blackwood, 37 Paternoster Row, E.C.), 2s. 6d.

"Elements of Agriculture," by W. Fream, LL.D. (John Murray, 50a Albemarle Street, W.), 3s. 6d.

"Botany for Beginners," by the Rev. Prof. G. Henslow (Stanford, 12-14 Long Acre, W.C.), 4s. 6d.

"Elementary Botany," by J. W. Oliver (Blackie & Son, 50 Old Bailey, E.C.), 2s.

"Elements of Botany," by Francis Darwin, F.R.S. (Clay & Sons, Ave Maria Lane, E.C.), 4s. 6d.

"Primer of Botany," by Sir J. D. Hooker, K.C.S.I. (Macmillan & Co., St. Martin's Street, W.C.), 1s.

"Structural Botany" (Flowering Plants), by Dr. D. H. Scott (A. & C. Black, Soho Square, W.C.), 3s. 6d.

"The Treasury of Botany" (Longmans, 39 Paternoster Row, E.C.), 15s.

"The Chemistry of the Garden," by H. H. Cousins (Macmillan & Co.), 1s.

"Diseases of Plants," by Prof. H. Marshall Ward, F.R.S. (S.P.C.K., Northumberland Avenue, W.C.), 2s. 6d.

"Manual and Dictionary of Flowering Plants and Ferns," by J. C. Willis, M.A. (Clay & Sons), 10s. 6d.

"The Forcing Book," by Prof. L. H. Bailey (Macmillan & Co.), 4s.

"Profitable Fruit Growing," by J. Wright, V.M.H. ("City Press" Office, Aldersgate, E.C.), 1s. 3d.

"The Principles of Fruit Growing," by Prof. L. H. Bailey (Macmillan & Co.), 5s.

"Thompson's Gardeners' Assistant," New Edition by W. Watson, 6 vols. (Gresham Publishing Co., 34 Southampton Street, Strand), £2 8s.

"Garden Flowers and Plants," by J. Wright, V.M.H. (Macmillan & Co.), 1s.

"Paxton's Calendar of Garden Operations" ("Gardeners' Chronicle" Office, 41 Wellington Street, W.C.), 7½d.

"The Art of Grafting and Budding," by C. Baltet (Crosby Lockwood, Stationers' Hall Court, E.C.), 2s. 6d.

"Primer of Horticulture," by J. Wright, V.M.H. (Macmillan & Co.), 1s.

"Farm and Garden Insects," by W. Somerville, D.Sc. (Macmillan & Co.), 1s.

"The Art and Practice of Landscape Gardening," by H. E. Milner, V.M.H., 21s.

- "Natural History of Plants," 2 vols., by Kerner & Oliver (Blackie & Son), 80s.
 "Nature Studies," by Prof. Scott-Elliot (Blackie & Son), 3s. 6d.
 "Nature Teaching," by Francis Watts, B.Sc., and W. G. Freeman, B.Sc. (John Murray), 3s. 6d.
 "The Nursery Book," by Prof. L. H. Bailey (Macmillan & Co.), 4s.
 "Physiology of Plants," by Dr. Paul Soraue (Longmans, Green & Co.), 9s.
 "Practical Physiology of Plants," by Francis Darwin, F.R.S. (Clay & Sons), 4s. 6d.
 "Plant Life," by Dr. M. T. Masters, F.R.S. (Vinton & Co., 8 Breems Buildings, Chancery Lane, E.C.), 2s. 6d.
 "Plant Breeding," by Prof. L. H. Bailey (Macmillan & Co.), 4s.
 "The Pruning Book," by Prof. L. H. Bailey (Macmillan & Co.), 5s.
 "The Soil," by A. D. Hall, M.A. (John Murray), 3s. 6d.
 "The Spraying of Plants," by E. G. Lodeman (Macmillan & Co.), 4s.
 "Trees," 6 vols., by Prof. H. Marshall Ward, D.Sc., F.R.S. (Clay & Sons), 4s. 6d. each.
 "Vegetable Culture," by A. Dean (Macmillan & Co.), 1s.
 "The Book of Vegetables," by G. Wythes, V.M.H. (John Lane, Vigo Street, W.), 2s. 6d.
 "The Book of Uncommon Vegetables," by G. Wythes, V.M.H. (John Lane), 2s. 6d.
 "The Principles of Vegetable Gardening," by Prof. L. H. Bailey (Macmillan & Co.), 4s.
 "Vegetables for Exhibition and Home Consumption," by E. Beckett (Simpkin, Marshall & Co., 4 Stationers' Hall Court, E.C.), 3s. 6d.
 "How to Study Wild Flowers," by the Rev. Prof. G. Henslow (R.T.S., 56 Paternoster Row, E.C.), 2s. 6d.

4. The Examination will be held simultaneously in as many different centres in Great Britain and Ireland as circumstances may demand.

5. The time allowed for the examination is three hours and a half, the hour fixed being generally from 6.30 to 10 P.M.

6. The Examination will for the most part be based on the above Outline Syllabus of "Elementary Principles of Horticultural Operations and Practice." It will, therefore, in all cases be absolutely essential for Students to exhibit a sufficient knowledge of the "Elementary Principles" named in the above Syllabus.

7. Every paper of Questions sent by the Society to the Supervisor will be numbered separately, and the Candidate must write that Number distinctly on the top of every sheet of paper he hands in to the Supervisor. He will also send his name and address privately to the Society in an envelope which will be sent for the purpose with each paper of Questions.

8. The Royal Horticultural Society will award a Silver Gilt Medal to the Candidate gaining the highest number of Marks, and will also, if the County Council or other body promoting the Lectures wish it, deliver to their Candidates Certificates of the Class in which they shall have passed.

9. County Councils, Lecturers, &c., must send in to the Society the names and addresses of Candidates at each proposed centre *at least ten days* before the Examination takes place. They must *at the same time* send a cheque at the rate of 5s. a head, *otherwise the entries cannot be received*. No entry fees can be returned.

10. Gardeners and Students wishing to sit for the Examination, who have not attended any particular series of Lectures, must send in their name and address, and also the name and address of some responsible person willing to conduct the Examination (*see par. 14*), to the Secretary,

R.H.S., Vincent Square, Westminster, at least three weeks before the date of Examination.

11. Every Student wishing to be examined must, as far as possible, give all the information asked for by filling up the form (see page 9 of Circular), which should be torn off and sent to the Secretary.

12. A capitation fee of 5s. will be charged for every Student, in order to partially defray the expenses of the Examination.

13. County Councils, Lecturers, and others desiring to have an Examination held in their neighbourhood must also send in the full name and address (with designation or occupation) of one responsible person for each proposed centre, who will undertake to supervise the Examination in accordance with the Society's rules.

14. N.B.—The Society is willing to hold an Examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to Examinations will consent to supervise one on the Society's behalf, and in accordance with the rules laid down for its conduct. But for obvious reasons no School teacher should act as supervisor at the School Teachers' Examination.

If any Candidate desires to sit in London for the General or School Teachers' Examination, he must say so on his entry form, and the Society will then make arrangements for him to attend at their Hall in Vincent Square, Westminster.

II.—SCHOOL TEACHERS' EXAMINATION IN COTTAGE AND ALLOTMENT GARDENING, WEDNESDAY, APRIL 24, 1907.

15. The Society will also hold an Examination in Cottage and Allotment Gardening, on Wednesday, April 24, 1907.

16. This Examination is intended for, and will be confined to Elementary and Technical School Teachers. It has been undertaken in view of the increasing demand in country districts that the school teachers shall be competent to teach the elements of cottage and allotment gardening, and of the absence of any test whatever of such capacity.

17. The general conduct of the Examination will be on the same lines as that of the General Examination, save in obvious points to which they would not apply.

OUTLINE SYLLABUS.

- (1) Some knowledge of the formation or nature of soils, not necessarily scientific, but such as is essential to cultivators.
- (2) Information as to the best average sizes of cottage gardens and allotments such as men engaged in diverse vocations can cultivate in spare time.
- (3) Preparation of soils for the reception of crops of all descriptions to ensure successful results.
- (4) Renovating neglected gardens.
- (5) Manuring soils for diverse crops, with some knowledge in practical form of the nature of manures and their constituents.
- (6) Spring vegetable crops, varieties and method of cropping, times for manuring, planting, &c.
- (7) Summer crops—successional.
- (8) Autumn or winter crops for successional purposes.

- (9) General treatment to secure best results for all seasons.
- (10) Suitable fruits for cottage gardens. Varieties, methods of culture, pruning and training. General treatment.
- (11) Fruits suitable for allotment culture.
- (12) Flowers for cottage gardens, seasons of flowering, methods of propagation, &c.
- (13) Flowers suited for allotments, varieties and general culture.
- (14) Window gardening, inside and out.

SCHOOL TEACHERS may also sit for the General Examination.

N.B.—Schoolmasters who have passed this Examination, if they subsequently wish to become Fellows of the Society, are exempt from entrance fee.

A stamped and directed envelope must be enclosed with all communications requiring a reply.

III.—PUBLIC PARKS EXAMINATION, MONDAY, JANUARY 14, 1907.

Specially intended for Gardeners employed in Public Parks and Gardens belonging to County Councils, City Corporations, and similar bodies.

The Council of the Royal Horticultural Society has consented to hold a Special Examination for Gardeners employed in the London and other City and Public Parks and Gardens, on January 14, 1907, at their Hall in Vincent Square, Westminster.

Candidates will be expected to have a knowledge of :—

1. Trenching, digging, and draining ; and the purpose of each.
2. Variety of soils and manures ; their effect and suitability to various purposes.
3. Grass land—renovation, turfing, relaying. Grass edges. Grass under trees.
4. Various methods of propagating trees and shrubs, herbaceous, greenhouse, and sub-tropical plants.
5. Trees, plants, and shrubs specially suitable for town growth and their correct nomenclature.
6. The general structure of plants.
7. Such elementary drawing as will assist in the formation of beds and their laying out.
8. Works and estimated expenditure on roads, paths, stonework, rockwork, fences, lakes, bridges, seats, &c.
9. Candidates will also be expected to display evidence of general knowledge and *observation*, and to be able to write an intelligent *Report* on any subject connected with their work.

No questions will be put bearing on the cultivation of fruit or vegetables.

The Examination, which will be partly written, partly *viva voce*, will occupy three hours and a half. It is absolutely necessary that all Candidates attend at the Royal Horticultural Hall, Vincent Square, Westminster, which is situated exactly midway between the Houses of Parliament and Victoria Station.

The Examination will commence at 10 A.M., and Candidates are requested to be in their seats at 9.55 A.M.

The general conduct of the Examination will be on the same lines as that of the General Examination, save in obvious points to which they would not apply.

Candidates must send in their names, at least ten days before the Examination takes place, but earlier if possible, to the Secretary, R.H.S. Office, Vincent Square, Westminster, S.W., together with an entrance fee of 5s. to partially defray the expenses of the Examination.

GENERAL EXAMINATION.

SCHOLARSHIPS.

A Scholarship of £25 a year for two years is offered by the Society, to be awarded after the 1907 examination, to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of eighteen and twenty-two years, and that he should study gardening for one year at least at the Royal Horticultural Society's Garden at Wisley, conforming to the general rules laid down there for students. In the second year of the Scholarship he may, if he likes, continue his studies at some other place at home or abroad which is approved by the Council of the Royal Horticultural Society. In case of two or more eligible students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

Similar Scholarships have been presented by :

Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., in 1894.

Baron Schröder, V.M.H., in 1895.

The Worshipful Company of Gardeners, 1896.

N. N. Sherwood, Esq., V.M.H., 1897.

G. W. Burrows, Esq., 1898.

The Right Hon. the Lord Amherst, 1899.

Henry Wood, Esq., 1900.

F. G. Ivey, Esq., 1901.

Sir William Farmer, 1902.

E. A. Strauss, Esq., 1903.

The Worshipful Company of Gardeners, 1906.

BORDER CARNATIONS AT WISLEY, 1905, 1906.

STOCKS of 181 varieties of Carnations were sent to the Society's Garden for trial, and planted out in the spring of 1905. Owing to drought on the light soil and most persistent attacks of thrips, the trial was not satisfactory, but layers were taken in the autumn and all the varieties were again tested, with one addition, in 1906.

F.C.C. = First-class Certificate.

A.M. = Award of Merit.

1. Albatross (Bath).—Self, delicate pink.
2. Alice Eyres (Veitch), **F.C.C.** July 26, 1887.—Fancy, white, slightly streaked crimson.
3. Alma-Tadema (Bath).—Self, bright yellow; good calyx.
4. Amber Queen (Bath).—Self, primrose-yellow.
5. Aurelian (Douglas).—Fancy, yellow ground, margined and marked rose; good calyx.
6. Aureola (Veitch).—Fancy, yellow ground, heavily edged and striped dark crimson.
7. Auther (Veitch).—Picotee, light yellow ground, edged delicate pink; good calyx.
8. Bachelor (Douglas).—Picotee, yellow ground, edged and splashed rose-lilac.
9. Baden-Powell (Bath).—Fancy, scarlet, striped and splashed crimson; good calyx.
10. Banshee (Douglas).—Fancy, lavender, flaked with rose; good calyx.
11. Beauty of Exmouth (Veitch).—Self, white.
12. Bertie (Veitch).—Fancy, pink-white, heavily marked and splashed crimson; bad calyx.
13. Bridegroom (Douglas).—Self, rose.
14. Burgundian (Stacey).—Two varieties received under this name: (a) Fancy, rose-heliotrope, splashed bright rose; (b) Self, rose.
15. Bush Hill Gem (Veitch).—Fancy, primrose-yellow, edged and lightly striped pink; good calyx.
16. Caronia (Bath).—Picotee, light yellow ground, thinly edged purple.
17. Cecilia (Veitch).—Self, clear yellow.
18. Chloris (Douglas).—Self, delicate pink; good calyx.
19. Climax (Bath).—Fancy, apricot ground, shaded and marked with rose-heliotrope; good calyx.
20. Copperhead (Douglas).—Self, dark apricot.
21. Countess of Strathmore (Douglas).—Picotee, yellow ground, with narrow light rose margin; good calyx.
22. Countess of Verulam (Douglas).—Picotee, yellow ground, margined (and striped) rose; bad calyx.

23. *Crimson Cloud* (Veitch).—Self, crimson, scented much like the old clove.
24. *Daffodil* (Douglas), **A.M.** July 26, 1904.—Self, yellow; large flower.
25. *Dazzle* (Bath).—Self, bright scarlet.
26. *Devonshire Hero* (Godfrey).—Self, crimson; good calyx.
27. *Dido* (Douglas).—Fancy, lavender, rose and buff centre.
28. *Duchess of Fife* (Veitch), **A.M.** June 12, 1894.—Self, delicate pink; good calyx. (Syn. *The Burn*.)
29. *Duke of Norfolk* (Douglas).—Self, scarlet.
30. *Earl of Mercia* (Veitch).—Self, bright scarlet.
31. *Ellen Terry* (Bath).—Self, rose.
32. *Empress Eugénie* (Veitch).—Picotee, yellow ground, with narrow rose margin; bad calyx.
33. *Enid* (Douglas).—Self, rose-pink; very good calyx.
34. *Exmouth Pink* (Godfrey).—Self, delicate pink; good calyx.
35. *Exmouth Rival* (Godfrey).—Fancy, buff-pink, striped red.
36. *Fiery Cross* (Bath).—Self, bright scarlet; bad calyx.
37. *Francis Samuelson* (Douglas).—Self, apricot; good calyx.
38. *François* (Stacey).—Self, white.
39. *Fredegonde* (Veitch).—Self, rose-pink; good calyx.
40. *General Locke* (Godfrey).—Self, bright rose; good calyx.
41. *Geo. Alexander* (Bath).—Self, yellow; bad calyx.
42. *Geo. Macquay* (Veitch).—Self, white; good calyx.
43. *G. H. Godfrey* (Godfrey).—Fancy, yellow ground, edged and splashed crimson; good calyx.
44. *Gil Polo* (Veitch).—Self, crimson.
45. *Gladys* (Bath).—Fancy, heliotrope; bad calyx.
46. *Gloire de Nancy* (Veitch).—Self, white, clove scented; bad calyx.
47. *Glow* (Bath).—Self, deep crimson; good calyx.
48. *Godfrey's Pride* (Godfrey).—Self, pink.
49. *Goliath* (Douglas).—Self, yellow.
50. *Gulnare* (Douglas).—Self, deep maroon; good calyx, fine flower.
51. *Heroine* (Bath), **A.M.** July 30, 1901.—Self, white; good calyx, neat flower.
52. *H. Falkland* (Veitch).—Fancy, yellow ground, edged and striped bright rose; good calyx.
53. *Hogarth* (Veitch).—Fancy, yellow ground, marked with rose-red and lavender; good calyx.
54. *Horsa* (Douglas).—Fancy, yellow ground, heavily marked and margined with crimson; good calyx.
55. *Ida* (Bath).—Fancy, white, lightly striped with light purple; good calyx.
56. *Janet* (Veitch).—Fancy, white, lightly striped with rose; bad calyx.
57. *Joe Willett* (Veitch).—Self, bright scarlet; bad calyx.
58. *Kaffir* (Douglas).—Self, bright crimson-maroon; good calyx, neat flower.
59. *Kubelik* (Bath).—Fancy, yellow ground, heavily edged and striped bright rose.

60. Lady St. Oswald (Veitch).—Picotee, yellow ground, with a narrow edge of bright red ; good calyx.

61. Lauzan (Veitch).—Picotee, yellow ground, with a medium edge of purple ; good calyx.

62. Lavender Girl (Godfrey).—Fancy, purplish lilac, splashed scarlet.

63. Leandro (Bath).—Self, delicate pink ; good calyx.

64. Linda (Simonds).—Self, white.

65. Longfellow (Bath).—Fancy, yellow striped and splashed rose and heliotrope ; bad calyx.

66. Lord Napier (Douglas).—Picotee, yellow ground, faintly edged with rose ; good calyx.

67. Lord Tennyson (Bath).—Fancy, yellow ground, very lightly edged and striped pink ; good calyx.

68. Mabel (Douglas).—Picotee, yellow ground, heavily edged purple ; good calyx, neat flower.

69. Maiden's Blush (Veitch).—Fancy, pinkish white, faintly striped rose ; good calyx.

70. Marie Studholme (Bath).—Self, yellow.

71. Maroon King (Clibrans).—Self, maroon.

72. May (Veitch), **A.M.** April 28, 1901.—Self, white ; good calyx.

73. Mazarin (Douglas).—Picotee, pale yellow ground, with broad margin of deep crimson ; good calyx.

74. Michelot (Veitch).—Self, apricot.

75. Minnehaha (Bath).—Self, rose ; good calyx.

76. Miss A. Campbell (Veitch).—Self, yellow.

77. Miss Ena Money (Godfrey).—Self, white ; bad calyx.

78. Miss M. White (Veitch).—Self, scarlet ; good calyx.

79. Miss Queenie Thatcher (Clibrans).—Self, pink.

80. Miss Shiffner (Veitch).—Self, rose.

81. Mrs. Charles Baring (Douglas, Veitch).—Fancy, yellow ground, heavily edged and striped dark crimson ; good calyx.

82. Mrs. Eric Hambro (Veitch), **A.M.** July 24, 1894.—Self, white.

83. Mrs. F. Watts (Veitch), **A.M.** June 9, 1889.—Self, white.

84. Mrs. J. P. Bryce (Godfrey).—Self, bright crimson ; good calyx, medium-sized flower.

85. Mrs. J. W. Flight (Veitch).—Self, rose-pink ; good calyx, free. Very near 87, Mrs. Nicholson.

86. Mrs. Leigh White (Veitch).—Self, white ; good calyx.

87. Mrs. Macrae (Veitch).—Self, bright scarlet. Not the same as Mrs. Mackrae.

88. Mrs. Nicholson (Godfrey, Veitch).—Self, rose-pink ; good calyx ; very free.

89. Mrs. R. Hole (Veitch).—Self, apricot.

90. Mrs. Sidney Mason (Bath).—Self, rose-heliotrope ; bad calyx.

91. Mrs. Walter Heriot (Douglas).—Picotee, yellow ground, with narrow margin of rose ; good calyx.

92. Molly Maguire (Douglas).—Fancy, buff ground, edged and striped rose.

93. Montjoy (Douglas).—Picotee, yellow ground, lightly margined and marked with rose.

94. Nubian (Bath).—Self, very dark crimson.
95. Oakley (Veitch).—Fancy, yellow ground, barred and flaked rose-mauve ; bad calyx.
96. Orient (Douglas).—Picotee, yellow ground, edged and striped purple ; good calyx, neat flower.
97. Oriental (Simonds).—Self, rosy-purple ; good calyx.
98. Othello (Douglas).—Picotee, yellow ground, with broad margin of crimson ; good calyx.
99. Phyllis (Bath).—Fancy, white ground, slightly splashed with red ; bad calyx.
100. Premier (Bath).—Self, yellow.
101. Professor (Bath).—Fancy, scarlet ground, splashed and striped crimson ; good calyx. There is also a yellow-ground Picotee bearing this name.
102. Professor Cooper (Douglas).—Fancy, deep buff ground, heavily marked with lavender and pink.
103. Purity (Bath).—Self, white.
104. Queen Alexandra (Bath).—Self, yellow ground.
105. Queen of Scots (Veitch).—Self, rose-pink.
106. Rabelais (Douglas).—Picotee, yellow ground with narrow purple margin ; neat flower.
107. Ruby Castle (Veitch).—Self, rose-pink, petals fringed.
108. Redlands Scarlet (Clibrans).—Self, scarlet.
109. Ringdove (Bath).—Fancy, heliotrope, splashed with rose.
110. Rosina (Stacey).—Self, bright rose.
111. Royal Standard (Veitch).—Self, bright rose ; good calyx.
112. Salamander (Veitch), **A.M.** August 9, 1892.—Self, rose-red ; bad calyx.
113. Scarlet Prince (Godfrey).—Self, bright red ; good calyx, neat flower.
114. Senator (Veitch).—Fancy, yellow ground, striped and splashed rose-heliotrope ; bad calyx.
115. Stacey's Countess (Stacey).—Self, white.
116. Sundridge (Veitch), **A.M.** July 12, 1898.—Self, scarlet ; good calyx.
117. Sweetheart (Veitch).—Fancy, buff ground, striped and splashed rose ; good calyx.
118. Teutonic (Bath).—Fancy, buff ground, edged and striped rose ; good calyx.
119. The Cid (Veitch).—Two varieties sent under this name : (a) Self, pink ; (b) Fancy, yellow ground, marked rose.
120. The Dawn (Douglas).—Self, rose-pink.
121. The Jap (Simonds).—Fancy, delicate pink ground, striped scarlet ; neat flower.
122. The Naiad (Veitch).—Self, yellow.
123. Triton (Veitch).—Self, maroon.
124. Trojan (Veitch), **A.M.** June 27, 1899.—Self, white ; good calyx.
125. Uncle Tom (Veitch).—Self, bright crimson ; good calyx, neat flower.
126. Unique (Bath).—Self, dark terracotta.

127. Venus (Veitch).—Self, yellow ; good calyx.
128. Violet Lloyd (Bath).—Picotee, white ground, heavily edged with bright rose ; very free.
129. Volage (Veitch).—Fancy, yellow ground, edged and striped bright red ; good calyx.
130. Volunteer (Bath).—Self, bright scarlet.
131. Winston Churchill (Bath).—Self, rosy red.
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The following variety was received in the spring of 1906, and proved to be one of the most free-flowering and showy in the collection.

132. Richness (Blackmore and Langdon).—Fancy, yellow, heavily edged and splashed scarlet ; good calyx, large flower.

CACTUS DAHLIAS AT WISLEY, 1905.

IN continuation of the trial of Cactus Dahlias at Chiswick in 1908, reported on in the JOURNAL, vol. xxviii. pp. 562-567, further stocks were received in the spring of 1904 and 1905, so that the collection under trial in 1905 comprised 186 varieties.

The plants were twice examined by the Floral Committee, and the following varieties, selected as the best for general garden decoration, were highly commended :

Amos Perry, Arab, Aunt Chloe, Cannell's Gem, D. A. Dunbar, Dainty, F. A. Wellesley, Floradora, J. H. Jackson, King of Siam, Mary, Mary Service, Mavis, Mrs. John Barker, Mrs. John Goddard, Mrs. J. S. Brunton, Mrs. McKergow, Orion, Peace, Reliable, Spotless Queen, Standard Bearer, and Waterloo.

A.M. = Award of Merit.

B.C. = Botanical Certificate.

XXX = Highly Commended.

The stocks were received in 1905 unless otherwise stated.

1. Ajax (Veitch), **A.M.** August 15, 1899.—Orange, suffused with salmon; large flower, with broad, slightly incurved florets. 4 ft.

2. Albion (Veitch), **A.M.** September 28, 1902.—White, with cream centre; strong stalks. 5 ft.

3. Alexander (Mortimer), **A.M.** September 20, 1904.—Dark crimson flower, of good form. 8 ft.

4. Alpha (Hobbies and Dobbie, 1903), **A.M.** September 10, 1901.—White, spotted and streaked crimson. Petals broad, stems weak. 4 ft.

5. Amos Perry (Hobbies), **A.M.** September 29, 1903, **XXX** September 28, 1905.—Large bright scarlet flowers with twisted petals, on good stiff stalks. 4 ft.

6. Annie Hervey (Wilks, 1904).—A crimson decorative variety. 4 ft.

7. Arab (Dobbie, 1903), **XXX** September 15, 1905.—Dark crimson, broad petaled flowers on long stiff stalks. 4 ft.

8. Aunt Chloe (Baxter), **A.M.** September 24, 1901, **XXX** September 15, 1905.—Deep crimson, twisted-petaled flowers, good stiff stalks. Free. Bushy habit. 8 ft.

9. Baden-Powell (Veitch), syn. Fire King.—Bright scarlet, small-flowered, decorative variety. Very free and showy. 4 ft.

10. Beacon (Hobbies).—Failed to flower.

11. Ben Nash (Shoesmith).—Large light crimson flowers, with long narrow, twisted petals, on good stout stalks. 4 ft.

12. Blush Queen (Mortimer), **A.M.** August 28, 1904.—Delicate rose-pink flowers, with cream centre, on good stems. 4 ft.

18. Britannia (Hobbies and Keynes Williams, 1903), **XXX** September 21, 1900.—Good-sized, broad-petaled salmon flowers. Free. Bushy habit. 8 ft.

14. Canary (Dobbie, 1908).—Flowers canary-yellow, with broad, pointed petals. 5 ft.

15. Cannell's Gem (Veitch), **A.M.** September 12, 1898, **XXX** September 28, 1905.—Decorative variety. Salmon-red, small flowers, very free. 8-4 ft.

16. Capstan (Veitch).—Rosy salmon, very free and good bushy habit, but poor form. 8-4 ft.

17. Captain Broad (Veitch).—Vivid scarlet flowers, with short, broad petals. Bushy. Free. 8 ft.

18. Charm (Hobbies).—Long yellow and reddish-bronze twisted petals, tipped white. Free, but drooping flowers. 8-4 ft.

19. Cheal's White (Cheal).—Good creamy-white flower. 5 ft.

20. Cinderella (Veitch), **A.M.** September 8, 1896.—Crimson-purple, broad-petaled flowers, of poor form. 4 ft.

21. Columbia (Veitch), **A.M.** September 24, 1901.—Base and margin of petals bright red, tips and centres white, long twisted petals, stalks weak and flowers drooping. 8-4 ft.

22. Comet (Hobbies and Veitch).—Petals lilac-pink, spotted and streaked purple. Flowers large. 5 ft.

23. Constance (Baxter).—Light crimson flowers, with long twisted petals. 8-4 ft.

24. Cornucopia (Veitch).—Reddish-salmon flowers of good form. Free. 4-5 ft.

25. Coronation (Keynes Williams, 1908), **A.M.** September 28, 1902.—Garden-cactus. Vivid scarlet flowers, of medium size and good form. 8-4 ft.

26. Countess of Hopetoun (Dobbie, 1908).—Good, white, broad-petaled flowers, on very strong stalks. 4 ft.

27. Cycle (Veitch), **A.M.** September 8, 1896.—Deep red, broad-petaled flower. Petals paler at tips. 3 ft.

28. D. A. Dunbar (Cheal), **XXX** September 15, 1905.—Salmon-scarlet flowers with long twisted petals, on long stalks, well above the foliage. Very free. 4 ft.

29. Dainty (Hobbies), **A.M.** September 15, 1908, **XXX** September 15, 1905.—Centre, and ground colour, pale yellow, shading to light pink; tips yellow; petals straight. Flowers of good form, very fine, distinct and free. 4-5 ft.

30. Decima (Baxter).—Yellow, shaded bronze-salmon. Twisted petals. 5 ft.

31. Done (Hobbies).—Petals pink, with deeper-coloured vein streaks. Large flower. 4-5 ft.

32. Dorothy Vernon (Hobbies).—Bronze-salmon flower, of good form and size. Stiff stalks. 4-5 ft.

33. Edith Groom (Hobbies).—Creamy-white flowers, twisted petals. 4-5 ft.

34. Effective (Hobbies).—Pale yellow, suffused salmon. Flowers of good form. Very free. 4 ft.

35. Ella (Veitch).—Apricot, shaded red. Flowers large, with twisted petals. 4-5 ft.

36. Emperor (Veitch), **A.M.** September 12, 1899.—Rosy-purple petals, with yellow bases. 4 ft.

37. Etna (Baxter), **A.M.** September 28, 1902.—Petals rose-lilac, with the bases shading to yellow. 8-4 ft.

38. Eva (Veitch), **A.M.** September 28, 1902.—A white flower, of good colour and form. 8-4 ft.

39. Exquisite (Veitch).—Reddish apricot. Very free-flowering, but flowers of indifferent form. 8-4 ft.

40. Fantasy (Veitch), **A.M.** September 8, 1896.—Small light scarlet flowers, with much-curved petals. 4 ft.

41. F. A. Wellesley (Shoesmith), **A.M.** August 19, 1902, **XXX** September 28, 1905.—Flowers scarlet, the petals shading at the tips to a light rosy purple. Flowers well above foliage. Free. 4-5 ft.

42. Fire King (Jekyll, 1904).—Bright scarlet. A very free, showy, small-flowered, decorative variety. 8-4 ft.

43. Flamingo (Hobbies, 1908).—Very large, scarlet, broad-petaled flowers, of poor form. 4-5 ft.

44. Floradora (Veitch), **XXX** September 15, 1905.—Large crimson flowers. Very free and bushy. 8-4 ft.

45. Florence (Dobbie and Hobbies, 1908).—Buff-coloured semi-double flowers. 4-5 ft.

46. Florence M. Stredwick (Hobbies and Veitch).—Flowers white, but with many small deformed florets. 4-5 ft.

47. Florrie Tranter (Mortimer, 1908).—Rose-salmon petals, yellow at their bases. Coarse flowers. 4-5 ft.

48. Fred. Cobbold (Hobbies, 1908).—Large bright scarlet flowers, with long-twisted petals. Free. 5 ft.

49. Freedom (Cheal), **A.M.** September 10, 1901.—Pom-cactus. Small, bright scarlet, narrow-petaled flowers. Free. 5 ft.

50. Gabriel (Veitch), **A.M.** September 10, 1901.—Petals red base and margin, white tips and centre, but very sportive. 4 ft.

51. Galliard (Veitch), **A.M.** September 11, 1900.—Reddish-apricot flowers, on good strong stalks. 4 ft.

52. Garden-Cactus, Magenta Pink (Hobbies, 1908).—Rose-salmon. 4 ft.

53. Garden-Cactus, Yellow (Hobbies, 1908).—Yellow, tinged bronze. Free. 4 ft.

54. General Gordon (Wilks, 1904).—Bright red, decorative variety. 4-5 ft.

55. George Gordon (Hobbies), **A.M.** September 15, 1908.—Petals yellow, shading to bronze. Poor grower. 8 ft.

56. Gloriosa (Veitch).—Flowers large, scarlet. Petals broad, slightly twisted. 5 ft. (Decorative-Cactus.)

57. Gracie (Hobbies).—Rosy-salmon flowers, with long twisted petals. 4 ft.

58. Harbour Lights (Hobbies), **A.M.** September 20, 1904.—Very large orange-red flowers, of good form, with long twisted petals, but the flowers almost buried in the foliage. 4-5 ft.

59. Helen Stephens (Hobbies), **A.M.** September 20, 1904.—Light yellow flowers, of good form. Petals twisted. 4-5 ft.

60. Hereward (Hobbies).—Petals cream, heavily spotted and striped lilac to crimson; good stiff stalks. 4–5 ft.

61. Hetty Dean (Hobbies, 1908).—Buff, tinged rose. Very free. 4 ft.

62. H. F. Robertson (Baxter).—Large bright yellow flowers, of good form. 4 ft.

63. H. J. Jones (Baxter), **A.M.** September 28, 1902.—Delicate primrose centre, shading to pink at the tips of the petals. Flowers large and of good form. 5 ft.

64. Honeysuckle (Hobbies, 1908).—Rose-buff flowers, with much-twisted petals. 3–4 ft.

65. H. W. Sillem (Hobbies).—Large crimson-scarlet flower, with long, narrow, twisted petals. Free, but flowers drooping from short stalks. 5 ft.

66. Ida (Baxter).—Bright yellow flowers, with rather broad petals. 4 ft.

67. Imperator (Baxter), **A.M.** September 11, 1900.—Large crimson-scarlet flowers, with long, twisted petals. 3–4 ft.

68. Innocence (Mortimer).—Flowers white with yellow centre. Bold and well above the scanty foliage, but the individual flowers on short drooping stalks. 3–4 ft.

69. Isabella (Veitch).—Petals rose-pink, yellow at base and tip; long and much twisted. 4 ft.

70. J. C. Quinnell (Hobbies).—Large salmon-red flowers, with long, twisted petals. Flowers on long stiff stems. 4–5 ft.

71. Jealousy (Veitch), **A.M.** September 11, 1900.—Yellow, broad-petaled flowers. 4–5 ft.

72. Jessie (Mortimer).—Flowers bright rose-pink with light centre. Free and showy, but most flowers semi-double. 4 ft.

73. Jewel (Mortimer).—Bright salmon flowers, of fine form. Very free, and flowers well above the scanty foliage, but drooping. 3–4 ft.

74. J. H. Hudson (Cheal, 1903).—Rose, buff base. 3–4 ft.

75. J. H. Jackson (Veitch), **XXX** September 15, 1905.—Very large, broad-petaled, deep crimson flowers. 3–4 ft.

76. John Burns (Hobbies, 1908).—Light crimson, broad-petaled flowers. 4 ft.

77. Juarezii (Jekyll, 1904), **B.C.** September 16, 1879.—Large, very broad-petaled, bright scarlet flowers. 4–5 ft.

78. J. Weir Fife (Hobbies, 1908).—Crimson, touched with purple. Flowers large. 3 ft.

79. J. W. Wilkinson (Veitch), **A.M.** September 11, 1900.—Large light crimson flowers, tipped purple. Long, narrow petals. Free, but flowers of poor form.

80. King of Siam (Cheal, 1903), **XXX** September 28, 1905.—Large, broad-petaled, rose-purple flowers. Free-flowering on stiff stalks. 4 ft.

81. Lady Colin Campbell (Baxter).—Centre yellow, outer petals buff. 3–4 ft.

82. Lady N. Balfour (Cheal).—Large crimson-scarlet flowers, with long, twisted petals. Long stalks. 4 ft.

83. Lauretta (Hobbies), Laurette (Veitch).—Rosy-salmon flowers, buff at the bases of the petals. 4–5 ft.

84. Liberty (Hobbies, 1903).—Crimson-scarlet, broad-petaled flowers. 4 ft.

85. Lord Alverstone (Cheal).—Large bright rose-salmon flowers. 4 ft.

86. Lord Brassey (Hobbies, 1903).—Large mauve-pink flowers. 8-4 ft.

87. Lord Roberts (Hobbies, 1903), **A.M.** September 25, 1900.—Flowers creamy white, on weak stalks. 4-5 ft.

88. Lovely (Veitch).—Flowers rose-pink with cream centre, broad-petaled. Flowers hidden in the foliage on account of the very short stalks. 4-5 ft.

89. Lucifer (Dobbie, 1903).—Very large orange-red flowers, with twisted petals, on weak stalks. 4-5 ft.

90. Mabel Needs (Mortimer, 1903).—Large rose-scarlet flowers, with long, twisted petals. 4-5 ft.

91. Mabel Tullock (Baxter), **A.M.** September 23, 1902.—Rose-pink flowers, with yellow at the base of the twisted petals. 4 ft.

92. Maid of Honor (Baxter).—Rose-pink flowers, with twisted petals. 4-5 ft.

93. Manxman (Mortimer, 1903), **A.M.** September 23, 1902.—Orange-scarlet flowers, on good stiff stalks. 4 ft.

94. Mary (Treseder, 1903), **XXX** September 23, 1905.—Very liable to sport. Typically, the petals had red base and edge, with white tip and centre, but many flowers were red selfs. 4 ft.

95. Mary Service (Keynes Williams, 1903), **A.M.** September 21, 1897, **XXX** September 15, 1905.—Salmon-pink, shaded with orange. Free. Good stalks. 4 ft.

96. Mavis (Baxter and Hobbies), **XXX** September 15, 1905.—Buff-salmon petals, yellow at their bases. Very erect stiff stalks. 4 ft.

97. Meteor (Mortimer, 1903).—Soft crimson, tipped purple. Coarse flower. 4 ft.

98. Midnight Sun (Veitch).—Crimson, shaded with purple. Broad petals, poor form. 4 ft.

99. Miss Constance Farmer (Hobbies).—Rose-purple, broad-petaled flowers. Many semi-doubles. 4-5 ft.

100. Miss Finch (Cheal), **A.M.** September 21, 1897.—Bright crimson-purple, broad petals. Free-flowering. 4 ft.

101. Miss G. Cooke (Hobbies, 1903).—Broad-petaled, rose-purple flowers, with nearly white centre. Flowers drooping. 4 ft.

102. Miss Winchester (Baxter).—Salmon-red flowers on long stalks. Free-flowering. 4 ft.

103. Miss Winstanley (Dobbie and Hobbies, 1903).—Light scarlet flowers. 8 ft.

104. Mr. Keith (Hobbies).—Large bright crimson flowers. Broad petals, but short stalks. Very free and showy. 4 ft.

105. Mrs. Arthur Bridge (Cheal).—Salmon-red flowers, on long, stiff stalks. Free-flowering. 3 ft.

106. Mrs. A. F. Perkins (Cheal), **A.M.** September 24, 1901.—Twisted petals of sulphur-yellow, tipped with white. 4-5 ft.

107. Mrs. Barnes (Veitch).—Large, broad-petaled, semi-double flowers, yellow centre, shaded and tipped pink.

108. Mrs. Cameron Shute (Cheal).—Deep scarlet flowers, with twisted petals. 4 ft.

109. Mrs. Carter Page (Veitch).—Large scarlet flowers of good form. 3-4 ft.

110. Mrs. Clinton (Mortimer, 1903).—Large buff-salmon flowers. Broad petals. Long, weak stalks. 4 ft.

111. Mrs. D. B. Crane (Cheal, Hobbies, and Veitch).—White flowers, on long, stiff stalks. Very late. 4-5 ft.

112. Mrs. D. Cornish (Hobbies).—Petals salmon-red, with buff bases. Long, weak stalks, but free-flowering. 4 ft.

118. Mrs. de Luca (Cheal and Veitch), *A.M.* September 10, 1901.—Flowers yellow, shaded buff. The best in the collection for freedom of flowering, with but little foliage. 4 ft.

114. Mrs. E. Mawley (Veitch), *A.M.* September 24, 1901.—Petals yellow, tipped buff on the back. 4 ft.

115. Mrs. E. T. Powell (Cheal).—Fawn, shading to light pink. 4 ft.

116. Mrs. F. Goddard (Cheal, 1903).—Same as Mrs. J. Goddard, *q.v.*

117. Mrs. F. J. Pateman (Cheal).—Flowers salmon, shaded and based yellow. Free-flowering, but the flower-stalks weak. 4 ft.

118. Mrs. Gordon Sloane (Veitch), *A.M.* September 8, 1896.—Flowers dark salmon-red, broad petals. 4-5 ft.

119. Mrs. Gunther (Cheal, 1903).—Flowers light pink, with whitish centre. Petals broad, coarse. 4 ft.

120. Mrs. H. A. Needs (Veitch), *A.M.* September 24, 1901.—Rose-crimson flowers. Many semi-doubles. 3-4 ft.

121. Mrs. H. L. Brousson (Hobbies and Veitch), *A.M.* September 15, 1903.—Flowers buff, of good form, with long-twisted petals. Free-flowering. The flowers on long, stiff stalks. 3-4 ft.

122. Mrs. James Bailey (Mortimer, 1903).—Dark salmon. Free-flowering, with the flowers held well above the foliage. 3-4 ft.

123. Mrs. J. Goddard (Cheal and Veitch), *A.M.* October 10, 1890, **XXX** September 15, 1905.—Large dark scarlet flowers, on very long, stiff stalks. Petals broad. Free-flowering. 4 ft.

124. Mrs. John Barker (Mortimer, 1903), **XXX** September 28, 1905.—Very large salmon flowers, with twisted petals. 4 ft.

125. Mrs. J. J. Crowe (Veitch), *A.M.* September 12, 1899.—Flowers yellow. 4-5 ft.

126. Mrs. J. P. Clarke (Hobbies, 1903).—Petals broad, dark buff, tipped pink. Late-flowering. 4 ft.

127. Mrs. J. S. Brunton (Mortimer), **XXX** September 28, 1905.—Good yellow flowers, on long, stiff stalks. 4-5 ft.

128. Mrs. J. W. Wilkinson (Hobbies and Veitch).—Large mauve-pink flowers, with twisted petals, but buried in foliage. 4-5 ft.

129. Mrs. Mackintosh (Baxter).—Flowers scarlet. Free-flowering, but many of the flowers semi-double. 4 ft.

130. Mrs. M. A. Mortimer (Mortimer).—Flowers light rose-mauve. Petals yellow at base. 4 ft.

131. Mrs. McKergow (Cheal), **XXX** September 15, 1905.—Petals light buff, with yellow bases. Very free. 3-4 ft.

182. Mrs. Morreau (Cheal).—Large bright maroon flowers, with broad petals. 8-4 ft.

183. Mrs. Mortimer (Cheal).—Large salmon-red flowers, with long, twisted petals. Free-flowering. 4 ft.

184. Mrs. Seagrave (Cheal).—Large bright-crimson flowers, with long, narrow-twisted petals. 5 ft.

185. Mrs. S. T. Wright (Shoemith).—Flowers rose-pink, with cream centre. Very free-flowering, but of poor form. 4 ft.

186. Mrs. Sonnenthal (Cheal).—Very large bright-crimson flowers, tipped with purple. Broad petals and long flower-stalks. 4-5 ft.

187. Mrs. W. Cash (Cheal).—Flowers yellow, shaded buff. Long, pointed petals. 8-4 ft.

188. Mrs. W. Marshall (Mortimer).—Very large broad-petaled flowers, the inner florets creamy white, the outer pink. Long, stiff flower-stalks. 8-4 ft.

189. Northern Star (Hobbies), A.M. August 26, 1890.—Large dark scarlet flowers. 4-5 ft.

140. Oliver Twist (Hobbies).—Very large light scarlet flowers, with narrow, much-twisted petals. 5 ft.

141. Orion (Cheal), XXX September 15, 1905.—Large rose-mauve flowers with straight petals, tipped at the base with yellow. Free-flowering; long, stiff flower-stalks. 8 ft.

142. Osprey (Hobbies).—Yellow, spotted and streaked scarlet. Petals pointed, and flowers of good form, on long, stiff stalks. 4 ft.

143. Peace (Keynes Williams, 1903), XXX September 28, 1905.—Flowers cream, of poor form, but held well above the foliage on long stalks. 8-4 ft.

144. Pickwick (Hobbies).—Large orange-scarlet flowers, the petals yellow at the base and much twisted. Free-flowering, and the flowers well above the foliage. 4-5 ft.

145. Pink Pearl (Hobbies).—Bright pink flowers with paler centre. Very free and showy. 4-5 ft.

146. Premier (Hobbies).—Large scarlet flowers with very narrow twisted petals. 5 ft.

147. Prince of Orange (Baxter).—Flowers rose-mauve, with twisted petals. Very late-flowering. 4 ft.

148. Prince of Yellows (Hobbies, 1903), A.M. September 25, 1900.—Flowers large, broad-petaled, yellow. 4 ft.

149. Profusion (Cheal).—Small, rose-purple, broad-petaled flowers, many semi-doubles. 8 ft.

150. Progenitor (Veitch), A.M. September 20, 1898.—Large crimson-scarlet flowers. The petals broad and forked at the tips. 8 ft.

151. P. W. Tullock (Dobbie and Hobbies, 1903).—Large dark-salmon flowers, with long, twisted petals. 8-4 ft.

152. Queen Alexandra (Hobbies and Mortimer).—Flowers salmon, shaded with buff, of good form. 8 ft.

153. Radiance (Veitch).—Large orange-scarlet flowers, with broad pointed petals. 2-3 ft.

154. Rainbow (Veitch).—Flowers pink, with paler centre, of good form. 5 ft.

155. Red Rover (Veitch), **A.M.** September 12, 1899.—Huge bright scarlet flowers, with broad tapering petals. 5–6 ft.

156. Reggie (Hobbies).—Flowers crimson, small, but of good form and very free. 4 ft.

157. Reliable (Hobbies), **XXX** September 15, 1905.—Petals buff, shading to pink at the tips and yellow at the base. Free, and flowers well above the foliage, but stalks weak. 4 ft.

158. Richard Dean (Dobbie, Hobbies, 1903).—Large orange-scarlet flowers, the petals tipped with white. 4 ft.

159. Ringdove (Dobbie, 1903), **A.M.** September 24, 1901.—Petals pink, buff at bases. Very late-flowering. 2–3 ft.

160. R. Needham (Treseder, 1903).—Large crimson flowers, with long, straight, pointed petals, of good form, and held on long, firm stalks. 4–5 ft.

161. Rosine (Veitch), **A.M.** September 11, 1900.—Failed to flower. 2–3 ft.

162. Royal Purple (Veitch).—Flowers purple, small. Free. 3–4 ft.

163. Royal Scarlet (Mortimer).—Large scarlet flowers, with long, twisted petals, on good stalks. 2–3 ft.

164. Sailor Prince (Hobbies, 1903), **A.M.** September 24, 1901.—Dark scarlet. 4 ft.

165. Sceptre (Baxter).—Petals pink, with yellow bases. Flowers of good form, on long, stiff stalks. 3 ft.

166. Sea Queen (Hobbies, 1903).—Flowers orange-red, tipped purple. Petals broad. 3 ft.

167. Shrewsbury (Baxter).—Flowers lemon-yellow, with long, twisted petals. 3–4 ft.

168. Sirius (Hobbies).—Flowers yellow, heavily striped with red; long, twisted petals, of good form. 4 ft.

169. Slough Rival (Veitch).—Large maroon flowers, with broad, twisted petals. 4 ft.

170. Spotless Queen (Dobbie, Hobbies, 1903), **A.M.** September 10, 1901, and September 29, 1903, **XXX** September 28, 1905.—Broad-petaled, white flowers. Free. 3 ft.

171. Standard Bearer (Veitch), **XXX** September 28, 1905.—Flowers orange-scarlet, broad-petaled, on good stalks. Flowers small, but very free. 3–4 ft.

172. Starlight (Mortimer).—Outer petals pale mauve-pink, inner almost white. Late-flowering. 4 ft.

173. Stella (Veitch).—Large, broad-petaled, salmon-scarlet flowers. 3–4 ft.

174. Sunshine (Veitch).—Broad-petaled, rather coarse, orange-red flowers, supported on strong, stout stalks. 4 ft.

175. Sweet Nell (Hobbies), **A.M.** September 15, 1903.—Flowers deep pink, with pale centre. Very free-flowering, and the flowers held well above the foliage, though on short stalks. 5–6 ft.

176. Sybil Green (Hobbies).—Flowers white, semi-double, on weak stalks. 5–6 ft.

177. The Queen (Cheal).—Flowers with yellow centre, shading to pink on the outer florets. 4–5 ft.

178. Trixie (Hobbies).—Flowers buff, shaded salmon. Very free-flowering. 3-4 ft.

179. Uncle Tom (Baxter), **A.M.** September 12, 1899.—Dark maroon, broad-petaled flowers, of good form. Free-flowering. 4 ft.

180. Violetta (Hobbies).—Bright rose-purple flowers, of good form. 4-5 ft.

181. Vivid (Mortimer).—Large bright orange-scarlet flowers, with twisted petals. 4 ft.

182. Waterloo (Walker, 1904), **XXX** September 15, 1905.—Flowers salmon-red, on long stalks. Narrow tipped petals. 4 ft.

183. W. F. Balding (Bunyard), **A.M.** September 10, 1901.—Flowers yellow, shaded buff. 4-5 ft.

184. Winsome (Veitch), **A.M.** September 23, 1902.—Creamy-white flower, with broad, twisted petals, on good, stiff stalks. 4 ft.

185. Yellow Gem (Hobbies).—Flowers pale yellow, of good size and form. 4-5 ft.

186. Zephyr (Veitch).—Rose-pink flowers, of good form, on long, weak stalks. 4 ft.

SWEET PEAS AT WISLEY, 1906.

A TRIAL of recently introduced varieties was held in the Society's Garden and inspected by the Floral Committee on July 6, 1906. All were sown six inches apart, making excellent growth and flowering profusely. Sixty-two stocks, representing forty-six varieties, were received, and the following representing the best varieties were highly commended:

Countess Spencer.	Hon. Mrs. Kenyon.
Dainty.	Jeanie Gordon.
Dorothy Eckford.	John Ingman.
Helen Lewis.	Miss Willmott.
Helen Pierce.	Mrs. G. Higginson, Jnr.

A.M. = Award of Merit.

XXX = Highly Commended.

The varieties tried may be arranged under colours as follows:

Crimson and Scarlet:

Coccinea.
King Edward VII.
Scarlet Gem.

Flakes and Fancies:

Agnes Johnston.
Annie Stark.
Elfrida.
Florence Molyneux.
Jessie Cuthbertson.
Mrs. H. K. Barnes.

Lavender and Blue:

Flora Norton.
Helen Pierce **XXX**
Lady Cooper.
Miss H. C. Philbrick.
Mrs. Chas. Foster.
Mrs. G. Higginson, Jnr. **XXX**

Orange:

Evelyn Byatt.
Helen Lewis (bicolor) **XXX**
Mildred Ward.
Miss Willmott **XXX**

Pink:

Blanche Ferry (bicolor).
Bolton's Pink.
Countess Spencer **XXX**
Dainty (picotee) **XXX**
Gladys Unwin.
Janet Scott.

Rose and Carmine:

George Herbert.
Jeanie Gordon (bicolor) **XXX**
John Ingman **XXX**
Lord Rosebery.
Phyllis Unwin.
Rosie Sydenham.

Violet and Purple:

David R. Williamson.
Duke of Westminster.
Mrs. Walter Wright.
Romolo Piazzani.

White:

Dorothy Eckford **XXX**
White Wonder.

Yellow and Buff:

Dora Breadmore.
Hon. Mrs. Kenyon **XXX**
Lady Mary Ormsby Gore.
Marchioness of Cholmondeley.
Mrs. Fitzgerald.
Sue Earl.

Cupid:

America.
Captain of the Blues.
Royalty.

1. Agnes Johnston (Barr).—Standard erect, flat, light salmon-pink, wings cream-pink. Flowers of medium size, 3-4 to a stem.
2. America (Barr).—See Cupids.
3. Annie Stark (Dobbie).—A very mixed strain of this new variety. Standards white, flaked pale rose. Flowers of medium size, 2-3 to a stem.
4. Blanche Ferry (Barr).—Standard erect, very smooth and flat, but short and notched, bright rose, wings pink-white. Flowers of medium size, 3 to a stem. Distinct. Several "rogues" among the seed sent.
5. Bolton's Pink (Barr).—Standard erect, pink. Flowers large, 2-3 to a stem. Burns badly.
6. Captain of the Blues (Barr).—See Cupids.
7. Coccinea (Barr), **XXX** July 27, 1898.—Standard erect, very smooth and flat, deep salmon-rose, approaching scarlet. Flowers of medium size, 3 to a stem.
8. Countess Spencer (Barr, Dobbie, Sydenham, Veitch).—Only the strain from Mr. Sydenham proved pure. This was awarded **XXX** July 6, 1906. Standard erect, waved margin, light pink, shading at the margin to a deeper pink. Wings erect, embracing. Flowers very large, bold, 3-4 to a stem.
9. Dainty (Veitch), **XXX** July 6, 1906.—Standard erect, slightly hooded, white, shading at the edges to a light pink. Flowers of medium size, 3-4 to a stem. Distinct.
10. David R. Williamson (Barr).—Standard erect, slightly hooded, purple with wings blue-purple. Flowers of medium size, 2-3 to a stem.
11. Dora Breadmore (Barr).—Standard rather hooded, cream-buff. Flowers of medium size, 3 to a stem.
12. Dorothy Eckford (Barr, Veitch), **A.M.** September 2, 1902, **XXX** July 6, 1906.—Standard slightly hooded, pure white. Flowers large, bold, 3 to a stem.
13. Duke of Westminster (Barr), **XXX** July 27, 1898.—Standard rather hooded, purple; wings purple-violet. Flowers of medium size, 2-3 to a stem, more purple than Mrs. Walter Wright.
14. Elfrida (Barr).—Standard erect, pale buff, striped rose. Flowers of medium size, 2-3 to a stem. Very near Jessie Cuthbertson, but a shade weaker in the stripe.
15. Evelyn Byatt (Barr, Watkins & Simpson).—Standard erect, orange-pink, wings rose-pink. Flowers of medium size, 2-3 to a stem.
16. Flora Norton (Barr).—Standard erect, pale blue. Flowers medium to small, 2-3 to a stem. Rather more deeply coloured than Mrs. G. Higginson, Jr.
17. Florence Molyneux (Dobbie).—Standard erect, cream-white, lightly flaked deep rose, variable. Flowers of medium size, 3-4 to a stem.
18. George Herbert (Barr).—Standard erect, waved, bold, carmine-rose, wings deep rose. Flowers very large, 3 to a stem; more intense in colour than John Ingman, which it closely resembles, but the seed received was weak.
19. Gladys Unwin (Barr, Veitch, Watkins & Simpson).—Standard erect, waved, bold, delicate pink shading at the margin to a richer pink. Wings erect, embracing. Flowers very large, 3-4 to a stem.

20. Helen Lewis (Barr, Sydenham), **XXX** July 6, 1906.—Standard erect, waved, orange-pink, wings pink. Flowers large, 3-4 to a stem.

21. Helen Pierce (Barr), **XXX** July 6, 1906.—Standard erect, flat, pale blue, shading to and veined with a deeper blue. Flowers of medium size, 3 to a stem. The most distinct of the new varieties.

22. Hon. Mrs. Kenyon (Barr), **XXX** July 6, 1906.—Standard erect, cream. Flowers of medium size, mostly 2 to a stem. The young flowers are of a light primrose colour and represent the nearest approach to yellow.

23. Janet Scott (Barr, Veitch). — Standard erect, smooth, slightly hooded, pink. Flowers large, 3 to a stem.

24. Jeanie Gordon (Barr, Veitch), **XXX** July 6, 1906.—Standard slightly hooded, light rose, wings cream-rose. Flowers of medium size, 3 to a stem. Veitch's strain badly mixed.

25. Jessie Cuthbertson (Veitch).—Standard erect, slightly hooded, cream, splashed bright rose. Flowers of medium size, 2-3 to a stem.

26. John Ingman (Barr, Dobbie, Sydenham), **XXX** July 6, 1906.—Standard waved, bold, bright rose, with deeper coloured wings. Flowers large, 3-4 to a stem.

27. King Edward VII. (Barr, Veitch).—Standard erect, smooth, slightly hooded, crimson. Flowers large, 3 to a stem. The best crimson.

28. Lady Cooper (Barr).—Standard erect, lavender. As many "rogues" as true plants.

29. Lady M. Ormsby-Gore (Barr).—Standard hooded, cream-buff. Flowers small, 2-3 to a stem.

30. Lord Rosebery (Barr).—Standard hooded, deep rose. Flowers of medium size, 3 to a stem.

31. Marchioness of Cholmondeley (Barr).—Standard hooded, cream-buff, tinged pink. Flowers of medium size, mostly 2 to a stem.

32. Mildred Ward (Sydenham).—Standard erect, orange, wings bright pink. Flowers small, 2-3 to a stem. Burns badly. Inferior to Evelyn Byatt.

33. Miss H. C. Philbrick (Barr).—Apparently identical with Flora Norton, *q.v.*

34. Miss Willmott (Barr), **XXX** July 6, 1906.—Standard hooded, rich orange-pink, wings pink. Flowers large, 2-3 to a stem.

35. Mrs. Charles Foster (Sydenham).—Lavender, shaded rose. Extremely weak seed. 2 flowers to a stem.

36. Mrs. Fitzgerald (Barr), **XXX** July 27, 1898.—Standard erect, slightly hooded, very light, cream-pink. Flowers of medium size, 2-3 to a stem.

37. Mrs. G. Higginson, Jnr. (Barr), **XXX** July 6, 1906.—Standard erect, of a pure pale blue. Flowers small, 3 to a stem.

38. Mrs. H. K. Barnes (Dobbie).—Standard erect, cream, shaded pink; wings cream. Flowers of medium size, 2-3 to a stem.

39. Mrs. Walter Wright (Barr, Veitch).—Standard hooded, mauve to rose-purple. Flowers of medium size, 2-3 to a stem.

40. Phyllis Unwin (Watkins & Simpson).—Standard erect, rose-pink. Flowers large, 3 to a stem. A shade lighter than John Ingman.

41. Romolo Piazzani (Barr).—Standard hooded, blue-lilac, with more blue than Mrs. Walter Wright. Flowers of medium size, 2-3 to a stem. Strain very mixed and weak.

42. Rosie Sydenham (Sydenham)—Standard erect, waved, carmine-rose; wings erect, embracing. Flowers large, 4 to a stem. Of a richer colour than John Ingman.

43. Royalty (Barr).—See Cupids.

44. Scarlet Gem (Barr, Veitch).—Standard erect, scarlet. Flowers of medium size, 2-3 to a stem. Burns badly. Barr's strain very mixed.

45. Sue Earl (Barr).—Standard erect, cream, faintly tinged lavender, which intensifies with age. Flowers of medium size, 2-3 to a stem.

46. White Wonder (Barr).—Standard erect, not hooded, good white. Flowers of medium size, 3-4 to a stem, many flowers with double standards.

CUPID SWEET PEAS.

This is a strain of dwarfs, averaging 6 inches in height, of close compact habit, bearing generally two but often one or three flowers to a stem. At present the stems are short, the flowers inferior, and the period of blooming about a fortnight later than that of the tall varieties.

America (Barr).—Standard erect, pink, heavily splashed red.

Captain of the Blues (Barr).—Standard hooded, purple; wings blue-purple. The freest bloomer.

Royalty (Barr).—Standard hooded, rose-pink; wings light pink.

VIOLAS AT WISLEY, 1905, 1906.

In continuation of the Viola trial of 1904, 126 varieties of Violas were grown in 1905. All the varieties made excellent growth, and with a mulch of well-decayed leaf-mould, to keep the roots cool and moist, the plants blossomed freely and continuously from May to the late autumn. The following varieties were highly commended by a Sub-Committee of the Floral Committee who inspected the growing plants, and these varieties subsequently received an Award of Merit:

Councillor Watters.
 Doctor MacFarlane.
 Isolde.
 Stark's Royal Sovereign.

The trial was continued in 1906, when the variety Maggie Mott was highly commended.

A.M. = Award of Merit.

XXX = Highly Commended.

1. Aberdonian (Cocker).—Soft yellow, rayed, free.
2. Ada Anderson (Dobbie).—White ground, heavily edged with rose-lavender, slightly rayed, free.
3. Ada Fuller (Dobbie).—Cream ground, flaked with blue, rayed.
4. Admiral of the Blues (Clibrans, Dobbie).—Deep blue, round flower and small neat eye.
5. A. J. Rowberry (Dobbie).—Deep yellow, rayless.
6. Alex. Renton (Dobbie).—Rose-purple, much marbled with lighter shades.
7. Amy Barr (Dobbie).—Rose-lilac with lighter, rayed centre, free flowering.
8. Annie P. Paterson (Dobbie).—Cream, edged heliotrope, lightly rayed.
9. Archibald Grant (Dobbie), **A.M.** July 11, 1899.—Rich indigo-blue, fine long stalks.
10. Ardwell Gem (Dobbie), **XXX** July 4, 1898.—Pale yellow, rayed, good habit, free bloomer.
11. Baden-Powell (Dobbie).—Rose-purple, marbled. 'General Baden-Powell' is a different variety; see 46.
12. Bella Dalglish (Dobbie).—Rich purple, upper petals lavender, lower tipped lavender. Clear eye.
13. Bessie Clarke (Dobbie).—Deep lilac, slightly rayed.
14. Betha (Dobbie).—White, lightly rayed, large flowers.
15. Blue Bell (Dobbie).—Blue, rayed, small flower, but very free-flowering.
16. Blue Boy (Clibrans).—Light blue, with dark blue centre, slightly rayed. Small flowers.

17. Blue Cloud (Dobbie).—Creamy-white ground with blue edging (edging often absent in hot weather), rayed.
18. Blue Duchess (Dobbie).—Pale blue, slightly rayed.
19. Bronze Kintore (Dobbie).—Dark bronze, distinct, but plants variable.
20. Bullion (Dobbie), **XXX** July 5, 1898.—Bright yellow, rayed.
21. Chas. Jordan (Dobbie).—Bluish mauve, slightly rayed.
22. Cherry Park (Dobbie).—Pale lilac, rayed.
23. Christiana (Dobbie), **XXX** July 4, 1898.—Ivory-white, large yellow eye, good bedder.
24. Cocker's Yellow (Cocker).—Bright yellow, rayless, but poor plant.
25. Cooper O. Fogo (Dobbie).—Deep lilac, small flower, poor.
26. Councillor Watters (Dobbie), **XXX** July 17, 1905, **A.M.** July 18, 1905.—Violet-purple, very free, excellent bedder.
27. Countess of Hopetoun (Dobbie), **XXX** August 16, 1898.—Pure white.
28. Countess of Kintore (Dobbie).—Rich purple centre, shading to a broad edging of white.
29. Crieffie Smith (Dobbie).—Purple centre, shading to lavender.
30. David Simpson (Dobbie).—Dark purple, marbled lavender.
31. Dobbie's Blue Bedder (Dobbie).—Blue, with dark rayed centre and round neat eye. Very free-flowering.
32. Doctor MacFarlane (Dobbie), **XXX** July 17, 1905, **A.M.** July 18, 1905.—Rich purple centre, the upper petals and the edges of the lower shading to mauve. Very free-flowering.
33. Dorothy (Dobbie).—Pale blue, lighter centre.
34. Duchess of Argyle (Dobbie).—White ground, upper petals and the edges of the lower petals rose-purple. Heavily rayed.
35. Duchess of Fife (Dobbie), **XXX** August 2, 1892.—Yellow, edged heliotrope, slightly rayed. Free-flowering, good bedder.
36. Duchess of York (Dobbie).—White, lightly rayed, good flower.
37. Duke of Argyle (Dobbie).—Purple, marbled with rose.
38. Effie (Dobbie).—White centre, the upper petals, and edges of the lower, rose-purple.
39. Eldorado (Picker).—Large blue flower, lightly rayed.
40. Emma Sophia (Dobbie).—Very pure white rayless flower, but rather weak plants.
41. Fascination (Dobbie).—Bronze-purple, shading to lilac. Plants very variable.
42. Favourite (Dobbie).—Light blue, the centre with dark rays on a lighter ground. Free-flowering.
43. Florizel (Dobbie).—Lilac, with darker veins. Free-flowering, good bedder.
44. Flower of Spring (Dobbie).—Cream-white, rayless.
45. Formidable (Dobbie).—Cream-white, rayless.
46. General Baden-Powell (Dobbie).—Deep yellow, rayless, very poor plants. Distinct from 11 Baden-Powell.
47. General Hunter (Dobbie).—Deep crimson-purple, much marbled with lighter shades.

48. Gertie (Dobbie).—Lilac, with large yellow centre, rayed.
49. Hawk (Dobbie).—White, running to heliotrope at the edges, rayless.
50. Hector McDonald (Dobbie).—White ground, heavily rayed, broadly edged purple. Variable.
51. Hesslewood Gem (Picker).—Yellow, rayed.
52. Isolde (Dobbie), **XXX** July 17, 1905, **A.M.** July 18, 1905.—Bright yellow, rayless, good bedder.
53. Ithuriel (Dobbie).—Bright blue, lightly rayed, free-flowering.
54. J. B. Riding (Dobbie), **XXX** August 27, 1898, **A.M.** July 11, 1899.—Rose, slightly rayed, very free-flowering.
55. J. C. Erskine (Dobbie).—Dark bronze-purple, marbled with lighter shades.
56. Jean Craik (Dobbie).—White, edged heliotrope, slightly rayed.
57. Jennie (Dobbie).—Rich yellow, rayless.
58. Jessie L. Arbuckle (Dobbie).—Light rose-purple, with large darker centre.
59. John Cunningham (Dobbie).—Rose-purple, striped and marbled with lighter shades. Large flower.
60. Kate Hay (Dobbie).—Soft yellow, rayless, free-flowering.
61. Katie Cuthbertson (Dobbie).—Light rose-purple, upper petals pale lilac.
62. Kingcup (Dobbie), **XXX** June 17, 1904.—Bright yellow, rayless, very free-flowering.
63. Kitty Bell (Dobbie).—Lilac, very vigorous and free-flowering.
64. Klondyke (Dobbie).—Yellow, rayed.
65. Lady Grant (Dobbie).—Cream-white ground, edged with bluish purple, large flower.
66. Lady Margaret (Dobbie).—Pale yellow.
67. Lady Roberts (Dobbie).—Cream-white, edged pale blue, slightly rayed.
68. Lark (Dobbie).—White, faintly edged heliotrope, slightly rayed.
69. Lizzie Paul (Dobbie).—Bright yellow, rayed, good flower.
70. Lizzie Storer (Dobbie).—Centre rich purple, upper petals lavender, lower tipped lavender.
71. Lord Elcho (Dobbie), **XXX** July 4, 1898.—Yellow, heavily rayed.
72. Lucy Franklin (Dobbie).—Cream-white, lower petals blotched yellow.
73. Maggie Clunas (Dobbie).—Primrose, very slightly rayed.
74. Maggie Currie (Dobbie).—Rose-purple, upper petals shading to lilac, lower to light rose-purple.
75. Maggie Mott (Dobbie), **XXX** July 8, 1906.—Pale mauve, slightly rayed, free-flowering.
76. Magnificent (Dobbie).—Blue, rayed, large eye.
77. Marchioness (Dobbie), **XXX** July 5, 1898, **A.M.** July 27, 1898.—White, very free, good bedder.
78. Mary Robertson (Dobbie).—Primrose-yellow, rayless, free-flowering.
79. Mauve Queen (Dobbie).—Mauve, free bloomer.
80. Minnie J. Ollar (Dobbie).—Cream, deeply edged mauve, heavily rayed.

81. Miss E. Fulton (Dobbie).—Deep bronze-purple, marbled and splashed lavender.
82. Miss M. Gordon (Dobbie).—Cream-white, edged blue, distinct rayless eye.
83. Miss Powell (Dobbie).—White, edged lilac, rayed.
84. Miss Robertson (Clibrans).—Lilac, slightly rayed, very free-flowering.
85. Mrs. C. B. Douglas (Dobbie).—Deep yellow, slightly rayed.
86. Mrs. C. F. Gordon (Dobbie).—Purple centre, the upper petals and edges of lower petals shading to lavender.
87. Mrs. Chas. Turner (Dobbie), **XXX** July 4, 1893.—Violet-purple, good habit.
88. Mrs. James Lindsay (Dobbie).—Creamy white, edged pale heliotrope; large flower.
89. Mrs. J. Macrae (Dobbie).—White, rayless, large flower.
90. Mrs. John Robertson (Clibrans).—Cream ground, upper petals purple, lower with purple margin.
91. Mrs. Morton (Dobbie).—Cream, rayless.
92. Mrs. Pat (Clibrans).—Lilac.
93. Mrs. P. Braithwait (Dobbie).—Rich purple centre, upper petals pale lavender.
94. Mrs. S. Mitchell (Dobbie).—Crimson-purple, very large flowers.
95. Mrs. T. W. R. Johnston (Dobbie).—Deep purple, upper petals shading to blue, clear eye.
96. Mother Doulton (Dobbie).—Rose-purple, shading to lilac.
97. Nellie (Dobbie).—Ivory-white, small neat eye, rayless.
98. Nellie Currie (Dobbie).—Rich purple, upper petals shading to lilac.
99. Norah Marrows (Dobbie).—Very pale lilac, large yellow eye, rayed.
100. Ophelia (Dobbie).—Deep rose-mauve.
101. Paragon (Dobbie).—Rich deep violet, small distinct eye.
102. Pencaitland (Dobbie), **XXX** July 5, 1898, **A.M.** July 11, 1899.—White, lower petals shaded yellow and slightly rayed.
103. Primrose Dame (Dobbie).—Primrose-yellow, rayless, free-flowering.
104. Princess Ida (Dobbie).—Pale rose-heliotrope, distinct eye.
105. Princess Louise (Dobbie), **XXX** July 5, 1898.—Yellow, rayless.
106. Robert McKellar (Dobbie).—Deep, rich, marbled rose-purple.
107. Robert Menzies (Dobbie).—Deep crimson-purple, slightly marbled.
108. Robert Pirrie (Cocker).—Rich purple, with dark blotched centre; free-flowering.
109. Robin (Dobbie).—Pale lavender, scented violetta.
110. Saturn (Dobbie).—Deep cream, edged heliotrope.
111. Scotia (Dobbie).—Rich rose-purple, with the upper petals shading to lavender.
112. Shamrock (Dobbie).—Ivory-white, edged blue, rayless.
113. Stark's Royal Sovereign (Dobbie, Stark), **XXX** July 17, 1905, **A.M.** July 18, 1905.—Golden-yellow, rayless, fine free bedder.
114. Stobhill Gem (Dobbie).—Rich purple, upper petals shading to lavender, lower blotched lavender.
115. Symphony (Dobbie).—Creamy-white, faintly edged lilac, rayless.

116. Tessy (Dobbie).—White, heavily marked blue.
117. The Mearns (Dobbie), **XXX** August 5, 1891.—Rose-purple, upper petals lavender, free-flowering.
118. True Blue (Dobbie).—Deep blue with darker rays, very free.
119. Violetta (Dobbie).—White, large yellow centre, scented violetta.
120. White Duchess (Dobbie).—Creamy-white, edged blue, large eye, slightly rayed, free, good habit.
121. White Empress (Dobbie).—White, good flower.
122. William Haig (Dobbie).—Rich violet, with deeper colour round a small neat eye, free-flowering.
123. William Hamilton (Dobbie).—Rosy purple, lightly marbled; large flower.
124. William Neil (Dobbie), **XXX** July 4, 1893, **A.M.** July 5, 1897.—Pale rose, slightly rayed, free and distinct.
125. William Wilson (Dobbie).—Rich purple, slightly marbled with lavender.
126. W. P. A. Smith (Dobbie).—Cream, heavily edged pale heliotrope, rayed.

CUCUMBERS AT WISLEY, 1906.

FIFTY-EIGHT stocks of Cucumbers were received for trial, all of which were sown March 30. A few varieties did not germinate, but with these exceptions the germination was excellent. When large enough to plant out, each plant was put on a mound of good soil, and as the plants grew and commenced fruiting a light mulch of rich soil was supplied weekly. The plants were put 4 feet apart, and, growing quickly, they rapidly covered the roof of the two houses devoted to them. Many varieties proved very similar to each other, and could scarcely be termed distinct; those receiving some award from the Committee being considered not only distinct, but the finest in form, and the greatest bearers.

F.C.C. = First-class Certificate.

A.M. = Award of Merit.

XXX = Highly Commended.

XX = Commended.

1, 2. A 1, **XXX** June 8, 1906 (Sutton, Stanard).—Ready for use May 21; fruit 18 inches long; handsome; short neck; fine colour; white spines; excellent sturdy habit; heavy cropper.

3. Allan's Favourite, **A.M.** July 23, 1889 (Carter).—Ready for use May 25. Fruit 16 inches long; handsome; short neck; good colour; inclined to be smooth, with only a few white spines; sturdy habit. Heavy cropper.

4. Approved Lord Roberts (Carter).—See Nos. 23, 24.

5. Blair's Prolific (Carter).—The Committee decided this was not true. Very similar to 'Lockie's Perfection.'

6. Blue Gown, **F.C.C.** May 18, 1869 (Carter).—Ready for use May 28. Fruit very long, 18 to 20 inches; neck short; very dark colour; uneven in outline; large spines, and very coarse. Good crop.

7. Cardiff Castle (Carter).—Ready for use May 29. Fruit 12 inches long; short neck; good colour; white spine; small foliage and weak habit. Light crop.

8. Challenger (Carter).—Ready for use May 26. Fruit 18 inches long; long tapering neck; fine colour; white spines; sturdy habit. Heavy cropper.

9, 10. Delicacy, **F.C.C.** May 30, 1905 (Sutton, Mortimer).—Ready for use May 21. Fruit nearly 2 feet long; very handsome; fine deep colour; moderate neck; white spines; vigorous habit, and a very free bearer.

11. Epicure (Sutton).—Ready for use May 26. Fruit 18 inches long; short neck; fine colour; smooth or only a few white spines; sturdy habit. Heavy cropper.

12. Epicurean (Sharpe).—Ready for use May 27. Similar to No. 6.

13, 14, 15. Every Day, **F.C.C.** March 8, 1898, and **XXX** June 8,

1906.—Ready for use May 27. Fruit about 12 inches long; handsome; moderate neck; good colour; white spines; sturdy habit. A free-setting heavy-cropping variety.

16. *Excelsior* (Barr).—Ready for use June 1. Fruit about 14 inches long; short neck; green at the neck, shading to white at the point; smooth; sturdy habit. A very prolific variety.

17. *Famous*, A.M. May 25, 1901 (Mortimer).—Ready for use May 26. Fruit 18 inches long; short neck; good colour; white spines. A vigorous, free-bearing variety.

18. *Hazell's Perfect* (Sharpe).—Ready for use May 27. Fruit 15 inches long; good colour; long neck; rather smooth, with small white spines; sturdy habit. Free bearer.

19. *Ideal*, A.M. May 8, 1900, and XXX June 8, 1906 (Carter).—Ready for use May 27. Fruit 18 inches long; handsome; fine colour; very short neck; white spines; vigorous, and a great bearer.

20, 21, 22. *Improved Telegraph* (Carter, Dobbie, J. Veitch).—A very good form of the well-known 'Telegraph.'

23, 24. *Lockie's Perfection*, F.C.C. June 12, 1888 (J. Veitch, Carter).—Ready for use May 28. Fruit 12 inches long; handsome; short neck; nearly smooth; only a few white spines; vigorous. Fair crop.

25, 26. *Lord Roberts* (Sydenham, J. Veitch).—Ready for use May 27. Fruit about 18 inches long; handsome; deep green colour; short neck; white spines; pale green foliage. Good crop.

27, 28. *Magnum Bonum* (Mortimer, Carter).—Ready for use May 28. Fruit 15 inches long; short neck; white spines. Good crop.

29, 30. *Market Favourite*, XXX June 8, 1906 (J. Veitch, Carter).—Ready for use May 29. Fruit 18 to 20 inches long; handsome; fine colour; short neck; white spines; vigorous. A very free cropper, and one of the best of the long type.

31, 32. *Market Gem* (Veitch, Mortimer).—Ready for use May 26. Fruit 18 inches long; good colour; long neck; white spine; vigorous. Free-bearing.

33, 34. *Marvel*, F.C.C. March 10, 1896, and XX June 8, 1906 (Mortimer, Stanard).—Ready for use May 25. Fruit 18 inches long; deep colour; short neck; white spines; sturdy. Very heavy crop.

35, 36. *Matchless*, F.C.C. August 11, 1891, and XXX June 8, 1906 (Carter, Mortimer).—Ready for use May 28. Fruit 18 inches long; dark colour; short neck; white spines; handsome; immense foliage; some of the leaves 22 inches across. Very free bearer.

37. *Model* (Carter).—Ready for use May 24. Fruit 12 inches long; short neck; nearly smooth; white spines; small foliage; sturdy. Good crop.

38. *Monarch* (Stanard).—Similar to *Rochford's Market*.

39. *New Japanese Climbing* (Barr).—Seeds of this were received late. A rampant-growing variety, with very small prickly fruits, of no value.

40. *Peerless* (Sutton).—Ready for use May 30. Fruit 12 inches long; short neck; deep colour; white spines; very large foliage. Fair crop.

41, 42. *Pride of the Market* (Sutton, Barr).—Ready for use June 12. Fruit 12 inches long; short neck; white spines; very vigorous. A great bearer, but about 14 days later than others in commencing to fruit.

43. Prizewinner (Sutton).—Ready for use June 3. Fruit 12 inches long ; rather long neck ; good colour ; white spines ; sturdy. Light crop.

44, 45. Progress, F.C.C. May 8, 1894 (Mortimer, Stanard).—Ready for use May 26. Fruit 20 inches long ; short neck ; fine colour ; white spines ; handsome ; immense foliage. Heavy crop.

46. Purley Park Hero, F.C.C. August 26, 1884, and **XXX** June 8, 1906 (Carter).—Ready for use May 27. Fruit 18 to 20 inches long ; short neck ; deep colour ; nearly smooth ; white spines ; very vigorous ; great bearer.

47. Reward (Beckett).—Ready for use May 28. Fruit 18 inches long ; handsome ; short neck ; smooth ; foliage rather small ; sturdy. Good crop.

48. Rochford's Market (Carter).—Ready for use May 26. Fruit about 12 inches long ; short neck ; pale green ; white spines ; sturdy. Very heavy crop.

49. Royal Osborne (Carter).—Ready for use May 25. Fruit 12 inches long ; very thick ; some smooth ; others with white spines. Light crop.

50. Satisfaction, **XX** June 8, 1906 (Sutton).—Ready for use May 25. Fruit 15 inches long ; dark green ; short neck ; small white spines ; very vigorous. Heavy bearer.

51, 52. Sensation, F.C.C. July 12, 1898 (Sydenham, Mortimer).—Ready for use May 28. Fruit 18 inches long ; rather long neck ; nearly smooth ; white spines ; handsome ; robust habit. Heavy crop.

53. Sion House (J. Veitch).—Not true.

54. Success, F.C.C. May 25, 1892 (Carter).—Ready for use May 26. Fruit 14 inches long ; short neck ; nearly smooth. Light crop.

55. Telegraph, Rollison's (Carter).—A fine true stock of this old favourite. Ready for use May 27.

56. Unique, **A.M.** May 26, 1903 (J. Veitch).—Ready for use May 30. Fruit 12 to 14 inches long ; short neck ; dark colour ; white spines ; sturdy. Heavy crop.

57. Whitelaw's Early, **XX** June 8, 1906 (Whitelaw).—Ready for use May 23. Fruit 12 inches long ; short neck ; fine colour ; hanging in pairs ; white spines ; sturdy. Heavy crop.

58. XL All, **XX** June 8, 1906 (Kent & Brydon).—Ready for use May 28. Fruit 18 inches long ; handsome ; short neck ; white spines ; vigorous. Heavy crop.

POTATOES AT WISLEY, 1905.

ONE hundred and eighty stocks of Potatoes were received for trial, all of which were planted the first week in April, in soil deeply dug and heavily manured. Nearly all the "sets" grew well, but on the morning of May 23 there was a very sharp frost that cut down all growth to the level of the ground. However, an excellent new growth was made, and heavy crops were produced by the majority of the varieties. Most of the new varieties were much alike, and it is very difficult to distinguish the difference in many cases. Those varieties in which no mention is made of the colour of the flower did not bloom. The Fruit and Vegetable Committee examined the collection on two occasions, and by reason of their heavy crop, handsome appearance, and freedom from disease, ordered the following varieties to be cooked, viz.:

British Hero.	Hurst's Favourite.
Cigarette.	Marvel.
Dalhousie Seedling.	Norton Kidney.
Denbigh Giant.	Peckover.
Duchess of Cornwall.	Southern Queen.
Engineer.	Southern Star.
General Roberts.	The Gardener.
Highlander.	Thomas Southern.

Worcester Favourite.

F.C.C. = First-class Certificate.

A.M. = Award of Merit.

XXX = Highly Commended.

1. Abundance (Sutton).—White; flat round; eyes full; medium size. Heavy crop, free from disease; strong, tall haulm. Late. White flower.

2. Albert Victor (Barr).—White; round; eyes full; medium size. Light crop, free from disease; short haulm. Early. Purple flower.

3. Arbitration (Sharpe).—White; flat round; russet eyes; full; rather large. Good crop, free from disease; moderate haulm. Late. White flower.

4. Ashleaf (Sutton).—A very fine stock of this excellent and well-known early variety.

5. Astonishment (Ross).—White; round; russet; eyes shallow; medium to large; free from disease. Good crop; tall strong haulm. Midseason. White flower.

6. Battram's Bountiful (Battram).—Red; round; eyes shallow; medium size; free from disease. Good crop; short haulm. Midseason to late. Purple flower.

7. Beauty of Alton (Snook).—White; round; eyes full; medium size. Light crop, free from disease; short haulm. Early. Purple flower.

8. Boscabelle (Dobbs).—White; round; eyes shallow; very large;

handsome. Heavy crop, free from disease; tall, strong haulm. Late. Lilac flower. A promising variety.

9. British Hero, **A.M.** November 21, 1905 (Carter).—White; round; russety; eyes full; handsome; medium size. Very heavy crop, free from disease; strong, sturdy haulm. Late. Purple flower.

10. British Queen, **A.M.** August 15, 1905 (Williamson).—White; round; russety; eyes shallow; large; fine shape. Heavy crop, free from disease; tall, strong haulm. Midseason. Pale purple flower.

11. Brown's Supreme (Brown).—White; flat round; russety; eyes full; medium size. Poor crop, free from disease; tall, strong haulm. Late.

12. Carmen No. 2 (Laxton).—White; round; eyes full; large. Moderate crop, free from disease. Late. White flower.

13. Carmen No. 8 (Laxton).—White; round; eyes rather deep; russety; medium size. Fair crop, free from disease. Midseason. Purple flower.

14. Centenary, **A.M.** September 11, 1900 (Sutton).—White; flattish round; russety; eyes shallow; medium size; handsome. Good crop, free from disease; moderate, sturdy haulm. Midseason or late.

15. Challenger (Mason).—Pink; round; eyes shallow; uneven in size. Good crop, free from disease; tall, strong haulm. Late.

16. Champion II. (Dobbie).—White; round; eyes shallow; uneven in size. Light crop, free from disease; strong haulm. Late.

17, 18. Cigarette, **A.M.** November 21, 1905 (Barr, Williamson).—White; round; russety; eyes shallow; medium to large. Heavy crop, free from disease; very strong, tall haulm. Late. Purple flower.

19, 20, 21. Clarke's No. 1 (Laxton).—Pinkish salmon; round; eyes shallow; small. Poor crop, free from disease; moderate haulm. Midseason.

22. Colossal, **F.C.C.** December 18, 1892 (Barr).—White; kidney; eyes full; russety; handsome; medium size. Heavy crop, free from disease; moderate haulm. Midseason. Purple flower.

23. Dalhousie Seedling, **A.M.** October 24, 1905 (Kent & Brydon).—White; round; eyes shallow; russety; medium size; handsome. Heavy crop, free from disease; strong haulm. Late.

24. Dalmeny Beauty, **A.M.** September 11, 1908 (Williamson).—White; round; eyes full; russety; rather large. Heavy crop, free from disease; tall, strong haulm. Late. Purple flower.

25. Dane (Gooney).—Pale pink; round; eyes shallow; medium size. Light crop, free from disease; weak haulm. Midseason. White flower.

26. Daniels' Distinction (Daniels).—This variety had very large tubers. All diseased. Purple flower.

27. Daniels' No. 1 (Daniels).—White; round; russety; good form. Moderate crop, free from disease; rather weak haulm. Midseason. Purple flower.

28. Daniels' Sensation (Daniels).—White; flat round; eyes shallow. Heavy crop, free from disease; strong, sturdy haulm. Late. Purple flower.

29. Delaware (Laxton).—White; round; eyes shallow; medium size. Fair crop, free from disease; short haulm. Second early or midseason.

30. Denbigh Giant, **A.M.** November 21, 1905 (Winnard).—White; flat round; eyes full; handsome; over medium size. Great crop, free from disease; sturdy haulm. Late. Purple flower.

81, 82. Discovery (Sutton, Dobbie).—White; round; eyes full; russety; medium size. Heavy crop, free from disease; tall, strong haulm. Late. White flower. This variety requires a long season of growth.

88. Dobbie's Favourite (Dobbie).—White; round; eyes shallow; medium size. Good crop, free from disease; tall, strong haulm. Late.

84, 85. Duchess of Cornwall, **A.M.** October 24, 1905 (Williamson, Dobbie).—White; round; eyes full; handsome; russety; medium to large. Very heavy crop, free from disease; strong haulm. Late. Purple flower.

86. Duchess of Norfolk (Daniels).—White; round; eyes shallow; russety; medium size. Good crop, free from disease; tall, strong haulm. Midseason or late.

87. Earl Marischal (Sinclair).—White; round; eyes full; medium size. Light crop, free from disease. Late. Purple flower.

88. Earl of Chester (Dicksons).—White; flat round; eyes shallow; handsome. Heavy crop, free from disease; very strong haulm. Late. Purple flower.

89. Early Michigan (Laxton).—All the crop diseased.

40. Early Northern (Laxton).—Pale pink; pebble-shape; eyes full. Fair crop, free from disease; short haulm. Second early.

41. Early Ohio (Laxton).—Pale pink; round; eyes shallow; uneven in size. Moderate crop, free from disease; short haulm. Early.

42. Early Regent, **F.C.C.** October 10, 1898 (Sutton).—White; round; eyes rather deep; medium size. Heavy crop, free from disease; short, sturdy haulm.

48. Early Roberts (Laxton).—All the crop was diseased.

44. Edgcote Purple (Mann).—Purple; round; eyes shallow; medium size. Light crop, free from disease; weak haulm. Midseason. Purple flower.

45. Ellingford Hero (Brewer).—White; round; eyes full; medium size. Light crop, free from disease; weak haulm. Early.

46. Engineer, **A.M.** October 24, 1905 (Forbes).—White; round; eyes shallow; handsome; rather large. Very heavy crop, free from disease; strong, robust haulm. Late. Purple flower.

47. Enormous (Laxton).—No crop.

48, 49, 50. Ensign Bagley (Kent & Brydon, Cooper, Tabor, Dobbie).—White; round; eyes full; variable in size. Fair crop, free from disease; short, sturdy haulm. Midseason.

51. Epicure, **A.M.** August 15, 1905 (Sutton).—White; round; eyes rather deep; handsome; medium size. Great crop, free from disease; strong, sturdy haulm. Midseason.

52. Equitable (French).—White; flat round; eyes shallow; medium size; handsome. Heavy crop, free from disease; tall, strong haulm. Late. Purple flower.

53. Eureka (Dobbie).—White; round; eyes deep; rather large. Heavy crop, slightly diseased; tall, strong haulm. Late. Purple flower.

54, 55. *Excelsior* (Deal).—White; round; eyes full; medium size. Light crop, free from disease; weak haulm. Late. This is distinct from '*Excelsior*'—a kidney variety—that received a F.C.C. December 8, 1878.

56. *Forbes' Marvel*, XXX October 24, 1905 (Forbes).—White; round; eyes deep; rather large. Very heavy crop, free from disease; strong, robust haulm. Late. White flower.

57. *Fortune* (Laxton).—White, tinged with pink; pebble shape; eyes full. Good crop, free from disease; short, sturdy haulm. Early.

58. *Gem* (Gooney).—White; pebble-shape; eyes full; russety; medium size. Light crop, free from disease; short, weak haulm. Early. Purple flower. This is distinct from '*Gem*'—a round variety—that received an A.M. July 28, 1908.

59. *General Buller*, A.M. October 1, 1901 (R. Veitch).—White; flattish round; eyes full; russety. Heavy crop, free from disease; tall, strong haulm. Late.

60. *General French*, A.M. October 1, 1901 (Barr).—White; round; eyes shallow; medium to large. Enormous crop, free from disease; tall, strong haulm. Late. White flower.

61. *General Knolke* (Kerslake).—Pink; pebble-shape; eyes full; medium size. Light crop, free from disease; small, weak haulm. Early. White flower.

62. *General Roberts*, XXX December 5, 1905 (Barr).—White; flat round; eyes full; russety; handsome. Heavy crop, free from disease; weak haulm. Early. Yellow flower.

63. *Golden Nugget* (Steward).—White; round; eyes full; russety. Very light crop, free from disease; weak haulm. Early. Yellow flower.

64, 65. *Great Central* (Dobbie).—White; round; eyes full; russety; uneven in size. Heavy crop, free from disease; very strong haulm. Late. Purple flower.

66. *Green's Favourite* (Green).—White; round; eyes full; rather large. Heavy crop, free from disease; tall, strong haulm. Midseason. Purple flower.

67. *Gregor Cup* (Lord Carew).—Pink; round; very much diseased; purple flower.

68. *Hammond's Wonderful* (Laxton).—Very much diseased.

69, 70. *Harbinger*, A.M. August 5, 1897 (Sutton, Barr).—White; round; eyes shallow; russety; medium size. Very heavy crop, free from disease; very short, sturdy haulm. Early.

71. *Henry Scott* (Scott).—Light crop, all diseased.

72, 73. *Highlander*, XXX December 5, 1905 (Deal).—White; round; eyes shallow; russety; rather large; handsome. Very heavy crop, free from disease; strong haulm. Late. Purple flower.

74. *Hurst's Favourite*, A.M. November 21, 1905 (Hurst).—White; flat round; eyes full; russety; large; handsome. Heavy crop, free from disease; tall, strong haulm. Late. Purple flower.

75. *Ideal* (Laxton).—Pink; round; much diseased.

76. *Ideal*, A.M. August 15, 1905 (Carter).—White; kidney; eyes shallow; medium size; handsome. Good crop, free from disease; short, sturdy haulm. Early. White flower.

77. Ireland's Best (Williamson).—White; round; eyes shallow; rather small. Very heavy crop, much diseased. Midseason or late.

78. John Austin (Hobbies).—White; round; eyes full; russety; medium size. Light crop, free from disease; tall, strong haulm. Midseason or late.

79. John Ridd (Kime).—White; round; eyes shallow; medium to large. Heavy crop, free from disease; strong, tall haulm. Late. Purple flower.

80. Julie (Laxton).—White; kidney; eyes shallow; medium size. Moderate crop slightly diseased; short, sturdy haulm. Early. White flower.

81. Kaiser Krone (Laxton).—White; flat round; eyes full; handsome. Moderate crop, free from disease; short, strong haulm. Early.

82, 83. King Edward VII. (J. Veitch, Dobbie).—White, suffused and blotched with pink; round; eyes shallow; medium to large. Heavy crop, free from disease; tall, strong haulm. Late. Yellow flower.

84. King of the Earlies, A.M. September 20, 1892 (Barr).—White; pebble-shaped; eyes shallow; medium size. Heavy crop, free from disease; short sturdy haulm. Early. White flower. A fine early variety.

85. King of the West (Garaway). White; flat round; eyes full; large. Very heavy crop, free from disease; tall, strong haulm. Late.

86. Lady Deerhurst (Lord Deerhurst).—White; round; eyes full; small. Light crop, free from disease; tall, robust haulm; purple flower. Late.

87. Late Puritan (Laxton).—A midseason or late form of the well-known Early Puritan, with all its free-cropping qualities; free from disease.

88. Long's Seedling (Long).—White; long oval or kidney; eyes shallow; variable in size and shape. Light crop, free from disease; tall haulm. Late. White flower.

89. Lord Dundonald (Williamson).—White; round; eyes shallow; russety. Heavy crop, free from disease; very strong haulm. Late. Purple flower.

90. Lymm Gray, F.C.C. September 11, 1903 (Barr).—White; round; eyes full; handsome; medium size. Fair crop, free from disease; short, strong haulm. Midseason. Purple flower.

91. Magnum Bonum (Sutton).—Tubers small and much diseased.

92, 93. Maid of Coil, A.M. September 11, 1903 (Barr, Dobbie).—White; round; eyes rather deep; russety; medium size. Heavy crop, free from disease; tall, strong haulm. Late.

94. Mann's No. 1. (Mann).—White; round; eyes shallow; russety; Light crop, diseased; strong haulm. Late.

95. Mann's No. 2. (Mann).—White; round; eyes deep; very large. Heavy crop, free from disease; strong haulm. Late.

96. Mann's No. 3 (Mann).—Light crop, all diseased.

97. Marie Louise (Sim).—White; pebble-shape; eyes full; russety; medium size. Light crop, free from disease; short haulm. Early or midseason. Purple flower.

98. Market King (Deal).—White; kidney; eyes full; russety;

medium size. Poor crop, free from disease; tall, strong haulm. Mid-season. Yellow flower.

99. Massengrunder (Laxton).—White; round; eyes deep; medium size. Light crop, diseased; short, sturdy haulm. Late.

100. Maxim's Early (Boyce).—White; kidney; eyes full; russety; small and even in size. Light crop, free from disease. White flower.

101, 102. May Queen, **A.M.** August 5, 1905 (Sutton, Hurst).—White; kidney; eyes full; handsome. Good crop, free from disease; short, sturdy, and distinct haulm. White flower. An excellent early variety.

103, 104. Monarch (Wythes, Lord Carew).—White; round; eyes full; medium size. Good crop, free from disease; strong haulm. Mid-season. White flower.

105. Monte Cristo (Sharpe).—White; round; eyes shallow; russety. Light crop, free from disease; tall, strong haulm. Late.

106. New Queen (Laxton).—White, tinged with pink; round; eyes shallow; medium size. Light crop, free from disease; short haulm. Early.

107. Ninety-fold, **A.M.** July 10, 1900 (Sutton).—White; kidney; eyes rather deep; russety. Good crop, diseased; tall, strong haulm. Early or midseason.

108. Nobleman (Deal).—White; round; russety; eyes full; large. Heavy crop, free from disease; strong haulm. Late. Purple flower.

109, 110. Northern Star (Dobbie).—White; round; eyes full; russety; uneven in size. Heavy crop, free from disease; tall, strong haulm. Late. Purple flower.

111. Norton Beauty (Dobbie).—Pink; round; eyes shallow; medium size. Good crop, free from disease; tall, strong haulm. Late.

112. Norton Kidney, **XXX** November 21, 1905 (Miller).—White; flat round; eyes full; russety; handsome. Heavy crop, free from disease; tall, strong haulm. Late. Purple flower.

113. Old Ashleaf (Barr).—All the "sets" failed to germinate.

114. Peacemaker, **A.M.** December 5, 1905 (Scarlett, Dobbie).—White; pebble-shape; eyes full; russety. Heavy crop, free from disease; strong, tall haulm. Late.

115. Peckover, **F.C.C.** November 21, 1905 (Boyce).—White; round; eyes shallow; handsome; medium size. Very heavy crop, free from disease; robust haulm. Late. Purple flower. This variety was particularly good when cooked.

116. Pink Blossom (Dobbie).—White; round; eyes shallow; russety; medium size. Heavy crop; haulm weak. Late.

117. Pride of the Cotswolds (Barnett).—White; round; eyes shallow; rather large. Heavy crop, free from disease; haulm strong and tall. Late. White flower.

118. Pride of the South (Moody).—White; round; eyes full; large. Heavy crop, free from disease; strong haulm. Late.

119. Professor Walker (Barr).—White; round; eyes shallow; large. Heavy crop, free from disease; tall, robust haulm. Late. White flower.

120. Queen Alexandra, **A.M.** December 18, 1904 (Coleman).—White; round; eyes full; russety; handsome; medium size. Very heavy crop, free from disease; strong, sturdy haulm. Late.

121. Queen of Avon (Dobbie).—White; round; eyes full; excellent shape; medium size. Heavy crop, free from disease; tall, strong haulm. Late. Purple flower.

122. Quick Lunch (Weston).—Pinkish white; round; eyes shallow; medium size. Light crop, free from disease; weak haulm. Midseason.

123. Reading Russet (Mann).—Scarcely any crop.

124. Recompense (King).—White; round. A light crop, all diseased.

125. Red Standard (North-Row).—Red; round; eyes deep; large. Good crop, free from disease; strong, tall haulm. Late. Purple flower.

126. Reliance (Sutton).—White; kidney; eyes full; russety; medium size. Heavy crop, free from disease; moderate haulm. Midseason.

127. Ringleader, A.M. July 10, 1900 (Sutton).—White; kidney; eyes full; medium size. Good crop, free from disease; short, sturdy haulm. An excellent and distinct early variety.

128. Rising Sun (Sharpe).—White; round; eyes full; medium size. Light crop, slightly diseased; tall, strong haulm. Midseason.

129. Robust (J. Veitch).—White; round; eyes full; medium size. Light crop, free from disease; weak haulm. Late. White flower.

180. Rouge Royale, A.M. August 15, 1905 (Dobbie).—Pale pink; round; eyes full. Good crop, free from disease; short, sturdy haulm. Early.

181. Royal Kidney (Dobbie).—White; kidney or oval; eyes full; russety; medium size. Light crop, free from disease. Midseason. White flower.

181A. Royal Peter (Sharpe).—White; kidney; eyes full; russety; large. Heavy crop, free from disease; tall, strong haulm. Late. White flower.

182. Satisfaction, A.M. September 10, 1895 (Sutton).—White; flat round; eyes shallow; russety; medium size. Heavy crop, free from disease; moderate haulm. Midseason. Purple flower.

183. Schoolmaster (Walker).—White; round; eyes shallow; russety; medium size. Good crop, free from disease; moderate, sturdy haulm. Midseason. White flower.

184. Seedling No. 8 (Webber).—White; round; eyes full; uneven in size. Light crop, free from disease; weak haulm. Late.

185. Seedling No. 9 (Daniels).—White; round; eyes full; russety; medium size. Good crop, free from disease; short, sturdy haulm. Early. White flower.

186. Semper Fidelis (R. Veitch).—White; round; eyes shallow; medium size. Light crop, free from disease; weak haulm. Late. White flower.

187. Sion House Prolifio, F.C.C. April 11, 1905 (J. Veitch).—White; flat round or oval; eyes shallow; russety; handsome. Heavy crop, slightly diseased; moderate haulm. Late. White flower.

188. Sir David Lionel Salomons (Coleman).—White; round; eyes full; russety; good crop, free from disease; strong, sturdy haulm. Late. Purple flower.

189, 140. Sir John Llewelyn, A.M. September 11, 1900 (Barr, J. Veitch). White; kidney; eyes shallow; medium size; handsome. Good crop, free from disease; sturdy haulm. Early or midseason.

141, 142, 148. Sir Walter Raleigh (Laxton, Dobbie).—White; round; eyes shallow; medium size. Light crop, free from disease; short haulm. Late.

144. Six Weeks (Laxton).—Pink; round; eyes full; medium size. Light crop, free from disease; short haulm. Early.

145. Snowdrop, F.C.C. August 30, 1888 (Barr).—White; round to pebble-shape; eyes full; medium size. Light crop, free from disease; short haulm. Early.

146. Southern Queen, A.M. November 21, 1905 (Crampton).—White; kidney; eyes full; handsome; large. Heavy crop, free from disease; strong haulm. Midseason. Purple flower.

147, 148. Southern Star, A.M. November 21, 1905 (J. Veitch, Walker).—White; oval; eyes shallow; russety. Heavy crop, free from disease; sturdy haulm. Early. Purple flower.

149. Star of the East (Smith).—White; round; eyes full; russety. Fair crop, free from disease; strong haulm. Midseason.

150. Supreme, A.M. September 11, 1900 (Sutton).—White; round to pebble-shape; eyes shallow; usually russety. Very heavy crop, free from disease; moderate haulm. Midseason. White flower.

151. Sussex Leader (Chatfield).—White; round; eyes shallow; medium size. Heavy crop, free from disease; moderate haulm. Late. Purple flower.

152. The Crofter (Dobbie).—White; round; eyes full; medium size. Heavy crop, free from disease; sturdy haulm. Late. White flower.

153, 154, 155, 156. The Factor, F.C.C. April 25, 1905 (Williamson, Dobbie).—White; round; eyes full; russety; handsome; medium size. Very heavy crop, free from disease; strong, tall haulm. Late. Purple flower.

157. The Gardener, A.M. October 24, 1905 (Sinclair).—White; round; eyes shallow; handsome; medium to large. Heavy crop, free from disease; sturdy haulm. Late. Purple flower.

158. The Gem (Deal).—White; pebble-shape; eyes full; medium size. Light crop, free from disease; short haulm. Early. Purple flower.

159. The Gentleman (J. Veitch).—White; round; eyes full; medium size. Light crop, free from disease; short haulm. Midseason. Purple flower.

160, 161. The Provost (Dobbie).—White; round; eyes shallow; uneven in size. Good crop, free from disease; short haulm. Late. White flower.

162. The Queen (Laxton).—White, tinged with pink; eyes full; medium size. Light crop, free from disease; short haulm. Early.

163, 164. The Scot (Dobbie).—White; round; eyes deep; large. Heavy crop, free from disease; tall, strong haulm. Late. Purple flower.

165. The Sutton (Sutton).—Red; round; eyes deep; uneven in size. Fair crop, free from disease; moderate haulm. Midseason or late. Flowers white.

166. The Tunbridgian (Webber).—White; round; eyes full; very large. Light crop, free from disease; strong haulm. Late. Purple flower.

167. The Warrior (Dobbie).—White; flat round; eyes full; russety; handsome. Heavy crop, free from disease; strong haulm. Late.

168. Thomas Southam, **XXX** December 5, 1905 (Tanner).—White; flat round; eyes full; russety; handsome; large. Heavy crop, free from disease; strong haulm. Late.

169. Triumph (Laxton).—Red; round; eyes deep; medium size. Light crop, free from disease; very strong haulm. Late.

170. Triumph, **F.C.C.** September 12, 1898 (Barr).—White; flat round; eyes shallow; russety; medium to large. Heavy crop, free from disease; moderate haulm. Late. Purple flower.

171. Uncle Sam (Laxton).—White; flat round; eyes shallow; medium size. Fair crop, free from disease; moderate haulm. Late.

172. Up-to-Date (Barr).—A fine stock of this well-known variety.

178. Upton Lawn (Seddon).—White; flat round; eyes full; russety; large. Heavy crop, free from disease; tall, strong haulm. Late. Purple flower.

174. Veitch's Early Perfection (R. Veitch).—White, tinged with pink; round; eyes full; russety. Good crop, free from disease; sturdy haulm. White flower.

175, 176. Vermont Gold Coin (Dobbie, Wheatley).—White; round; eyes shallow; medium size. Heavy crop, free from disease; strong, tall haulm. Late. White flower.

177. Windsor Castle, **F.C.C.** September 12, 1898 (Sutton).—White; round; eyes shallow; russety; rather large. Heavy crop, free from disease; moderate haulm. Midseason or late.

178. Woodhay Wonder (Johnson).—White; pebble-shape; eyes full; russety; medium size. Good crop, free from disease; very tall, strong haulm. Late. Yellow flower.

179. Worcester Favourite, **XXX** December 5, 1905 (Wythes).—White; flat round; eyes shallow; russety; handsome; large. Heavy crop, free from disease; very strong haulm. Late. Purple flower.

PLANTS AND SEEDS TESTED AT WISLEY, 1905.

XXX=Highly Commended.

Althæa (Masters, Roemer). All the plants are being grown on.

Antirrhinum (Carter). A variety named 'Majus, Coral Red' growing about 2 feet high, with rose-coloured flowers having a pure white throat.

Aquilegia hybrids (J. Veitch, Gledstanes). Plants growing on.

Aster (J. Veitch, Roemer) :—

1. Comet, Dwarf. An excellent strain, with colours varying from pure white, rose, blue, to rosy-lilac.

2. Dwarf. A small chrysanthemum-flowered type, with blue and rose-coloured flowers, many of which were semi-double.

3. 'Earliest Parisian.' A dwarf variety, with semi-double purplish-blue flowers that are produced very early.

4. 'Parisian.' Rather weak-growing dwarf varieties, of various shades of colour.

5. 'Hohenzollern.' A dwarf strain, with flowers of the 'Comet' type, and of many colours; a very ornamental class.

6. 'Branching Scarlet.' Height about 18 in., branching with a profusion of dark red small flowers.

7. 'Christmas Tree.' This aster forms a perfect pyramid with medium-sized imbricated flowers, in colour varying from pure white to bright pink.

8. 'Giant Comet.' The white and the lilac-flowered varieties were very good, but the other colours were poor.

9. 'Ostrich Feather.' Plants 12 to 18 inches high; flowers rather small, with petals much curled; colours various.

10. 'Japanese Cardinal.' Plants 18 in. high, branching; flowers, medium size, dark red, with quilled florets.

11. 'Japanese.' Similar in size and habit to No. 10, but of various colours.

12. 'July Ray' and 'Ray.' Both of this class require further selection.

13. 'Sinensis.' The well-known single variety with lovely mauve flowers.

14. 'New Ray,' **XXX** September 15, 1905 (Carter). Height 18 in., branching; flowers, 4 in. across, rose-coloured, with long quilled petals; a distinct variety.

Begonia semperflorens 'Fairly Queen' (Roemer). A pretty but not new variety, with white flowers, flushed with rose at the margins; a useful bedding variety.

Balsam 'Rose Queen' (Carter). A very dwarf sturdy variety, with large double rose-coloured flowers, borne in profusion.

Calliopsis, mixed (Carter). Plants varying in height from 6 in. to 8 ft. Colours from bright yellow, with small red eye, to bright dark red selfs.

Candytuft 'White Spiral' (Carter). A good strain.

Chrysanthemums (Clibrans) :—

1. 'Clibran's Star.' Star-shaped and pure white.
2. 'Daisy.' Crimson-lake, with a ring of white round the disc.
3. 'Harold.' A very fine variety with large yellow flowers.
4. 'Hector Hampson.' Indian-red flowers, small but pretty.
5. 'Mildred Bradburn.' Yellow, with two rows of twisted petals.
6. 'Miss F. Howarth.' White, green disc, small.
7. 'Miss S. A. Ball.' White, tipped with pink, small and rather poor.
8. 'Mrs. E. Roberts.' Soft pink, fine large shapely flowers, excellent.
9. 'Mrs. Geo. Rhodes.' Reddish-pink.
10. 'Mrs. R. N. Parkinson.' Yellow, a large fine flower.
11. 'Rosalind.' Canary yellow, large, and of beautiful form.
12. 'Souvenir de Gladys Ashbrook.' Pink, with white ring round disc.

13. 'Tillie.' White, shading to pink; petals long and loose.

Cineraria 'Brilliant' (Carter). Plants dwarf, sturdy, with very large flowers of good shape and many colours.

Cineraria hybrida grandiflora 'Scarlet Queen' (Roemer). Flowers large, shapely, and of bright dark red colour, borne on sturdy dwarf plants.

Godetia 'Double Rose' (J. Veitch). Height 2 ft., branching, with a mass of semi-double pretty pink flowers.

Godetia 'Sunset' (J. Veitch). Height 1 ft., flowers bright rose with a white claw; a charming variety.

Helianthus, hybrid (Pemberton). Not so good as some already in cultivation.

Marigold, 'Dwarf Lemon' African (J. Veitch). Height 2 to 3 ft., with large lemon-coloured flowers.

Marigold, 'Dwarf Orange' (J. Veitch). Similar to the last-named, but with orange-coloured flowers.

Pelargoniums (Clibran) :—

1. 'Miss E. Bickham.' Flowers pure white, of excellent shape, and large truss.

2. 'Mrs. W. Cooper.' Crimson scarlet, with clear white eye, of fine form, and large truss.

3. 'Mrs. John Smith.' A very large flower of magenta-purple colour.

4. 'Mrs. W. Warburton.' Brilliant scarlet, shaded lightly with plum; a very handsome variety.

Primula sinensis fimbriata superba lutea (Roemer). Foliage and stems a dark purplish red, some of the leaves beautifully curled; flowers, medium size, yellow, with a white margin.

Poppy, French (Du Bois). A poor strain.

Scabious, mixed (Carter). Height 2 ft. and of many colours.

Streptocarpus hybridus erectus (Roemer). A fair strain, but not equal to some of the British strains.

MISCELLANEOUS VEGETABLES &c. AT WISLEY IN 1905.

Alsike (Weenstein).—Five unnamed varieties of *Trifolium hybridum*, none of which proved to be superior to varieties already in commerce.

Barley, Read's New (Read, U.S.A.)—A good variety, with fairly large heads and medium-sized corn, not equal to some of the best selected English varieties.

Bean, Scarlet Runner 'Excelsior' (Fletcher).—A prolific variety, but rather short in the pod.

Brassica chinensis, or Chinese Cabbage (Mark).—Heads immense, closely resembling 'Drumhead' and very solid. We doubt its being true to name.

Cabbage, 'Emperor' (Barr).—A strong-growing variety, with a moderate spread of outer leaves; hearts solid, roundish, very white, and standing drought well.

Cabbage, 'Barr's Giant' (Barr).—Too large for garden purposes.

Cauliflower, 'Early Selected' (Crook).—A good selection of 'Snow-ball.'

Cucumbers, 'White Spine' and 'Distinct' (Masters).—Both poor varieties.

Cucumber, 'Ideal' (Carter).—A medium-sized, handsome, and very prolific variety, a light green colour, and very short neck.

Leek, 'New Giant' (Barr).—A large, solid, strong-growing variety.

Melon, 'Early Burlington' (Masters).—Fruit oval, ribbed, well netted; flesh scarlet, and of good flavour. This cropped splendidly in a cold frame.

Melon, 'Early Bristol' (Masters).—Very similar to 'Early Burlington,' but larger.

Oats, 'Read's New' (Read, U.S.A.).—A good variety, but not specially so.

Trefoil (Weenstein).—An unnamed variety, of no special merit.

APPLIANCES &c. TESTED AT WISLEY, 1905.

Automatic Ventilator (Gardiner). This ventilator acts on the hydraulic principle, the pressure being obtained from a sensitive fluid, hermetically sealed in three tubes. When the temperature rises above any figure at which the apparatus may be set, the fluid expands, bringing pressure to bear on the sliding tube fitted to the lever opening the ventilator, opening the same; as the temperature falls, the contraction of the fluid causes the ventilator to close. Since the apparatus was fixed in November, it has worked fairly well, but the real test of its value or otherwise cannot be determined until warmer weather sets in.

Anti-Blight (Anti-Blight Co.). A very useful and effectual wash for aphids, thrip, or American blight (woolly aphid).

La Foudre (Cadix). A chemical manure applied at the rate of $1\frac{1}{2}$ oz. per square yard superficial. This was applied to broccoli plants, without any apparent results. This may arise from the dry season of 1905.

Lamp and Eureka-tine (Tomlinson & Hayward). A liquid that is placed in a small dish over a lamp, filling the house with a vapour deadly to insect life, but perfectly harmless to tender foliage or flowers, provided the instructions sent with each bottle are carried out properly.

Eureka-tine (Tomlinson & Hayward). An excellent insecticide for syringing or dipping plants infested with aphids.

Patent Incisor (Luzy Frères). A small instrument for "ranging" shoots or branches bearing fruit. It is claimed that by this process ripening of the fruit is hastened, the fruit is increased in size, and the quality is improved. As the fruit crop was a failure in 1905 at Wisley, this could not be tested.

Patent Infuser (Levi). A vessel with perforated sides in which manure is placed, and plunged in a tub or tank of water, to make liquid manure. It answers this purpose very well, but is not superior to the old-fashioned method of filling a sack with manure in a tank.

Raffiatape (West). A strong, durable, and excellent tying material on reels; the colour is a grass-green, and is scarcely noticeable, being about the same colour as the foliage.

Rusticide (Dicker). This is not only first-rate for destroying "rust" on plants, but is a very good insecticide for killing aphids.

Syringe, Sale's Patent Grit-proof (Sale). For use in the ordinary way. This syringe is rather too light to work comfortably, but where fine spraying is wanted it does its work admirably.

Sprayer and Insecticide (Holland). An unnamed liquid insecticide. Applied in the form of spray, it has proved deadly to red spider, aphids, and thrip, without the slightest injury to foliage.

Slugdeath (Stanley). This is the finest destroyer of slugs we have tried, either in a liquid or powder form. Put on according to the instructions supplied, it kills all the slugs, with no injury to the plants.

COMMONPLACE NOTES.

CLEMATIS STEMS SPLITTING.

MR. CHITTENDEN, Hon. Sec. Scientific Committee, writes :

"I find that some years ago (1899 I think) a discussion took place in the 'Deutsche Gärtner Zeitung' on a disease of clematis which from the account given seems to agree well with the appearance of the piece of split stem recently brought to the Scientific Committee. In the course of that discussion Dr. Sorauer stated that no fungi or bacteria were present as a direct cause, but that he considered the trouble was brought about by too much nourishment, too much water, and at times heat, although occasionally frost seemed to have injured the plants. He thought that well-drained land, a soil not too rich, and partial shade would prove effective remedies for the trouble.

"Messrs. Goos and Koenemann consider that the large fleshy roots of the clematis have the power of absorbing large quantities of water. Owing to this, after heavy rains greater amounts of water are sent into the woody parts than they are able to take, thereby bursting the cells in such parts where the pressure becomes too great. They think that with good drainage and rich soil strong runners will be produced, when the plant will be able to carry off any sudden flush of water.

"Another cultivator, this time in Austria, found that weak liquid manure acted as a stimulant to the plant and prevented any further trouble with the disease.

"The methods of treatment seem at first contradictory, but they apparently tend to ensure that the plant shall not absorb more water than it is able to make use of."

PSIDIUM OR GUAVA.

Novelties in fruits or vegetables, if of any merit, are always more or less in demand, and although the cultivation of the guava in this country is by no means new, it is more novel or rare than one would imagine, considering how easy it is to grow, and how well it fruits. Possibly one reason it is so seldom seen is that it is looked upon as a stove plant, requiring a good deal of heat all the year round, but it will grow and fruit freely in a house that is allowed to become comparatively cool during the winter months. The Rev. W. Wilks grows it remarkably well at Shirley Vicarage in a cool house, and the fruit is of a distinct and pleasing flavour. The variety Mr. Wilks has is *Psidium Guava*, or the pale-yellow fruited variety, of globose shape, and the size of a fair-sized gooseberry. The tree will grow from five to ten feet high, and is of bushy habit.

P. Cattleyanum is a larger-growing variety, and many years ago two large plants were growing in lofty vineries at a gentleman's seat in Derbyshire. While the vines were at rest the temperature was often as

low as 40°. Yet these plants always looked the picture of health and bore heavy crops of fine large claret-coloured fruits, that were highly esteemed on the dessert table. Both the trees were planted in a bricked-in enclosure, and required scarcely any attention beyond the usual watering and syringing. Both of the varieties deserve wider cultivation, and there are many conservatories, winter gardens, and similar structures containing plants nothing like so handsome or useful as the above. During the past year or two a large number of plants of *Psidium Guava* have been sent out to Fellows of the R.H.S. from seeds kindly supplied by Mr. Wilks from fruits of his own growing. If a tithe of these plants are growing well, this delicious fruit should be far better known in the near future. A compost of three parts good fibrous loam, one part leaf-mould, with sufficient sharp sand to keep the whole porous, suits the plants very well.

TOMATO SEEDS FROM DISEASED FRUITS.

To test the question whether seeds from diseased fruits of tomatoes transmitted the disease to the plants raised from such seeds, Mr. G. Massee sent seeds from fruits infested with almost every disease possible for the tomato to have; in fact, the fruits were a putrid mass of disease, and when the seeds were washed out, instead of being a pale colour, they were quite black. These were sown at Wisley in the usual way, and over 90 per cent. of the seeds germinated. The seedlings were rather weak as compared with those from clean healthy fruit, but they gradually gained in vigour, until they were quite as strong as other plants from seed obtained from clean sources. Later on they were planted out in one of the span-roofed houses at Wisley, where they made strong, sturdy growth, producing plenty of flower trusses, which set freely, the fruit swelling to the normal size, and the plants bearing a heavy crop. Needless to say, the plants were watched daily for any indications of disease, but none appeared on either foliage or fruit at any time from the germination to the finish of the crop. This seems to prove that disease is not transmitted through seeds from plants infected with fungoid or other diseases, but by outside conditions, over which the grower may or may not have control. Later on Mr. Massee will no doubt deal with this important subject much more ably and fully, and his remarks will be full of interest to all tomato-growers.

MANURE FOR APPLE AND PEAR TREES.

Recommended by Dr. Wagner, of Fellbrunnen, Osteroda, Harz.

For Apple trees.

1½ lb. sulphate of ammonia	} per tree in winter.
1½ lb. muriate of potash	
8½ lb. basic slag	

Pears.

8 lb. nitrate of soda	} per tree.
2½ lb. muriate of potash	
5 lb. basic slag	

EELWORMS.

These creatures are introduced with the soil, and in order to guard against their presence the soil should be mixed with kainit in the proportion of two bushels of kainit to one cartload of soil six weeks before the soil is used. The kainit should be very thoroughly mixed with the soil, so that every particle of the latter should come under its influence, and the whole should be turned twice during this period. Soil in which plants attacked by eelworms have grown should be mixed with gas-lime in the proportion of 8 lb. of gas-lime to a cubic yard of soil. After remaining for three months, it may be used as a dressing for grass or garden ground, but should not be employed for potting plants in. All pots, the brickwork of pits, or anything that this infested soil has been in contact with, should be scalded with boiling water.

CATERPILLARS IN PLUMS.

The following reply was given to a question as to some plums containing caterpillars :—

“The caterpillars feeding in the plums are the larvæ of a small moth belonging to the class *Tortrices* (*Carpocapsa funebrana*). The codlin moth (*C. pomonella*) belongs to the same genus. Stainton, in his ‘Manual of British Butterflies and Moths,’ mentioning where these caterpillars are to be found, says: ‘The larvæ are very frequent in plum pies.’ All the infested fruit should be destroyed as soon as the attack is detected. The caterpillars, when full-grown, bury themselves in the soil, probably about three inches below the surface, and become chrysalides, so that if the surface soil could be removed to that depth and be burnt, or buried deeply (say one foot), the chrysalides would be killed. A heavy dressing of fresh lime or kainit applied under the trees when the plums are getting ripe would kill the caterpillars when they reach the ground; a similar dressing in June would probably kill the moths when they emerge from the chrysalides and are trying to reach the surface.”

MANURE FOR A HERBACEOUS BORDER.

When, as is sometimes the case, it is undesirable for some reason to dig a border and work in stable manure, the following mixture should be applied in March: at the rate of 2 oz. of kainit, 1 oz. of guano, per square yard. Immediately afterwards mulch the border with well-rotted manure; this will supply humus to the soil, assist the retention of moisture, keep the roots cool, and do away with the necessity of digging.

BOOKS REVIEWED.

"The Structure and Development of Mosses and Ferns (Archegoniataë)." By D. H. Campbell. Second edition. 657 pp. (New York: Macmillan. 1905.)

Eleven years ago Professor D. H. Campbell published the first edition of his "Mosses and Ferns." That work represented a summary of our knowledge of the comparative structure and development of the Bryophyta and Pteridophyta, and students of this branch of botany found this treatise both valuable and even indispensable.

Since the issue of the 1895 edition a mass of information has accumulated, and this has resulted in the production of the present volume. The whole work has been revised and a good deal of new matter introduced, including two special chapters on the geological history of the Archegoniates and the significance of the alternation of generations. Besides incorporating the recent researches of other investigators, the writer adds new work of his own which is published for the first time.

An increase of nearly one hundred pages is noticeable in the second edition, and for this the Pteridophyta are mainly responsible. The number of new illustrations is fifty-six.

The Hepaticæ are first dealt with, and receive especially thorough treatment and a liberal allowance of 140 pages. The Ferns, following the Mosses, are dealt with in 210 pages; the account of their embryology and development is particularly full, but that of the anatomy is brief. After the Ferns come the Equisetineæ, then the Lycopodineæ, Isoëtaceæ, and finally Fossil Archegoniates. One of the most interesting alterations in the second edition is the removal of Isoëtes from the Marattiaceæ to a position next the Lycopods.

In the final summary the author concludes "that the Spermatophytes represent not one single line of development, but at least two, and perhaps more, entirely independent ones, having their origin from widely separated stocks. The Gymnosperms (at least the Conifers) are probably direct descendants of some group of Lycopods allied to the Selaginellaceæ or Lepidodendraceæ, while the origin of the Cycads and Angiosperms is to be looked for among the Eusporangiate Filicineæ."

"Nature and Origin of Living Matter." By Dr. H. C. Bastian. With an Appendix on "*De Novo* Origin of Bacteria and Medical Science." 8vo., 344 pp. (T. Fisher Unwin, London.)

This book contains fourteen chapters, the first eight dealing with the phenomena of living matter, evolution, &c., and the present occurrence of archebiosis. Chapters 9-13 contain illustrations of heterogenesis, the last being a Conclusion, with the congruity of the evidence. There are seventy-eight figures of microphotographic illustrations.

In describing the correlations of vital and physical forces, Dr. Bastian shows that *torula* will grow, not only in a solution of ammoniac tartrate

and phosphates, but in a solution of tartrate of ammonia alone: "The fact that this occurs shows not only that these simple saline substances contain the elements necessary for the formation of living matter, but that the passage must be comparatively easy from the saline mode of collocation of the elements into that by which they are converted into living protoplasm" (p. 18). Of course this is to prepare the reader for heterogenesis; but as these salts cannot *generate*, but only *support* life; so, without more proof than Dr. Bastian supplies, we do not see how infusions of hay, &c., can generate it either.

Recognising the fact that there is no "vital force" in the old sense of the term, his object is to prove that "living units" *can* arise out of solutions containing organic matter. "Such rudimentary forms of life are to be regarded as resulting from the collocation of organic molecules in peculiar modes, brought about by the expenditure of incident physical forces" (p. 19). He adds in a note: "Living matter, like crystalline matter, is only formable by a synthesis of its elements." So far it may be true, but he ignores a fundamental difference. Crystals of any mineral substance made to-day are identical with those made when the earth first cooled. On the other hand, life has ever varied in its bodily forms. "What determines molecular motion?" was Croll's question. No one knows. It is *constant* with crystals, but *cannot be foreseen* in the production of varieties and species in living beings. Life is a *directing* agent, as Croll showed, guiding physical forces, but is not a force itself.

Again, Dr. Bastian says: "Philosophically speaking, there can be no abrupt line of demarcation between the living and the non-living." But since no one has ever traced a path across the gulf, we think it is unphilosophical to make an *a priori* assumption without a shadow of proof. The fact that bodies are built up on organic food, which plants make from the mineral kingdom, is no proof or ground for the assertion, since there is *nothing* comparable to *life* in the mineral kingdom, however much the forces may be common to all three kingdoms.

Even if we take Haeckel's *Monera*, "naked, non-nucleated, structureless specks of protoplasm" (p. 26), they are *alive*, and it is *life*, not the chemical materials or forces, which has to be accounted for. But Dr. Bastian finds not only such simple things as bacteria and monads to arise, but amoebæ and ciliate infusoria by heterogenesis. Even chlorophyll granules can be converted into animals!

How does the elementary "vital unit" arise? This cytode or plastide, as some call it, begins as a "clear space among granules" in the infusion; subsequently it has a limiting boundary, it is filled with bacteria, and it finally develops a nucleus and a cell-wall. The question at once arises, What caused the "clear space"? Whatever the organism turn out to be, was there not its "germ" present, though at that stage invisible?

His first observation was made in 1871. He used a strong turnip infusion, carefully filtered. "In from three to four hours faint and ill-defined whitish specks, less than $\frac{1}{50000}$ " diameter, made their appearance" (p. 52). These develop into bacteria.

May not this experiment supply the key to the whole problem, or at all events to a very large part of it?

Dr. Dallinger, if we remember right, on one occasion watched for some day and a half, incessantly, a solution in which *nothing* could be seen; at last organisms began to appear, "like stars on a summer evening." If so, then Dr. Bastian's bacteria are giants when adult compared with the "white specks" and *their earlier* possible stages. Dr. Bastian does not seem to take any precautions to *exclude* living organisms, as Tyndall did, and then found nothing could arise of a living nature; so that one naturally thinks that Dr. Bastian's organisms came from the air. Indeed, he says: "It is well to see that one or more minute air bubbles exist somewhere in the film before applying some melted paraffin wax round the edge of the cover-glass" (page 52). What is to prevent these bubbles from contaminating the fluid with the invisible "originals" of bacteria? Dr. Bastian offers three alternatives:

- (a) The germs, though *visible*, had escaped observation;
- (b) The germs were *invisible*;
- (c) Archebiosis.

"The solution of this great problem passes beyond the reach of actual observation" (page 54).

If such be the case, then there is no other resource than to fall back upon analogies and probabilities. Dr. Bastian, of course, accepts the third hypothesis, and observes with regard to the second: "Invisible germs have only a hypothetical existence." Quite so, until they come into sight and are then visible as "faint specks." But something alive *must*, we think, have preceded the faint specks, though not visible till the latter were perceptible.

After discussing the possibility of crystalloids changing into colloids, he says: "These facts sufficiently show that, notwithstanding all their differences in property, the transition is fairly easy from the one to the other isomeric state" (p. 71). From this he infers that "it surely should not be *difficult to imagine* that molecular re-arrangements may take place among the constituents of ammoniacal salts of *greater complexity*, whereby a colloid may be produced *capable* of entering into the formation of that *simplest* form of protoplasm."

This suggests four questions in respect of the words we have italicised. Perhaps it is possible to "imagine," but where is there any evidence? Why are not the salts mentioned of "greater complexity," but left to the reader's imagination? How can the colloid be "capable" of any transformation into protoplasm without the aid of life pre-existent? What is meant by the "simplest" form of protoplasm, as all chemical formulæ for protoplasm are exceedingly complex? Even supposing certain crystalloids could become colloids, and colloids be transformed into protoplasm, how is the last to become *alive*? For living protoplasm can readily be killed, as Dr. Bastian frequently shows.

Dr. Bastian compares the origin of organisms to a "silver tree"; that as its "origin and growth occur simultaneously" [successively?], "conditions favourable for growth" may be equally true for living matter. So he tells us "we may be encouraged to hope that some conditions may be at last discovered, under the influence of which it may be freely admitted that living matter will take its origin, as well as merely grow, within some saline solution" (p. 142). So that, after all, we are no nearer any sure and certain

case of archebiosis, whether from the mineral world or from organic infusions.

With regard to the second half of the book, the reader must judge for himself as to the interpretation of Dr. Bastian's descriptions and photographs; but, as we observed, when we read that monads, fungus-germs, and amœbæ each and all come from masses of *zoogloea*, it is very difficult not to think that the germs were all there at first. Moreover, there is no proof that they were not. If 144° C. for five minutes was applied to closed tubes, and yet *torula* and fungus-spores were found in it, one can do no more than infer that this temperature had *not* killed their germs. "Zoogloea" appears to be a secretion from bacteria on a "jelly-like, glæal substance" as Dr. Bastian describes it (p. 185); but "zoogloea masses" are "aggregations of separate bacteria imbedded in a jelly-like material . . . and are destined ultimately to be converted into numbers of flagellate monads or of amœbæ, while others become resolved into heaps of fungus-germs." Dr. Bastian adds: "I have found it impossible to tell in their early stages, from the mere microscopical appearance of the zoogloea masses, whether they are destined ultimately to yield monads or fungus-germs" (p. 185). "I thoroughly satisfied myself that the corpuscles are, as a matter of fact, only individualised portions of the general zoogloea mass of which the pellicle is composed, each corpuscle containing several bacteria." "The corpuscle appears as a pellucid sphere, having a single flagellum and containing four or five bacteria." This is a monad, and a distinct nucleus now forms within it. Again, one asks, what *starts* the formation of the "corpuscle" among all the bacteria, if it be not an invisible germ or "pre-monad," as it might be called?

Another case is that of diatoms. They are found within sub-stomatal spaces. Dr. Bastian thinks that the evidence is overwhelming against chemotaxis and infection by diatoms. Adult forms may be too large to enter; but he does not allude to the fact which Ralfs found, and figured in the "Micrographical Dictionary" half a century or so ago, and G. Murray seems to have rediscovered, that a diatom can develop a number of smaller ones within itself. It has not been shown that the latter could not pass through a stoma.

Dr. Bastian proceeds to describe how *Anabena* can arise out of chlorophyll granules, as well as the transformation of resting-spores of *Vaucheria* into amœbæ. He finds motionless spheres in the place of chlorophyll; what is the proof that they are amœbæ? No mention is made of pseudopodia or motion. Another astonishing change is that "myriads of *Actinophrys* will appear within the closed cells of *Nitella*, by a transformation of chlorophyll corpuscles."

Ciliates can owe their direct amœboid origin to the pellicle (p. 284). "I call this 'an amœboid origin' in the pellicle, because these corpuscles, when they become larger than the tiniest specks, are seen to resemble embryo amœbæ in a resting stage." . . . "The early stages of these matrices have been demonstrated to be mere aggregates of bacteria, of a kind similar to those existing in the pellicle around them. Each of these aggregates becomes enclosed by a delicate bounding membrane, develops a nucleus, and then becomes evolved into an active embryo ciliate. This

embryo may be seen revolving within its cyst, previous to rupturing it and moving away as a free-swimming organism" (p. 289).

As before, it may be again asked what determines the ciliate to arise at any one particular point in the pellicle, unless there was a living, invisible "pre-ciliate" to start it? Why should not this theory or imagination be as feasible as archebiosis? Dr. Bastian himself says, "All I mean to convey is, that the ciliates take origin from the very minute corpuscles which are, at one stage of their existence, almost indistinguishable from the discrete corpuscles that develop into monads or amœbæ" (p. 841).

Instead of one and the same matter having the power to develop into three or more different kinds of being, what proof is there that these practically indistinguishable objects may not be the quite independent origin of all the different organisms? That no such minute germs have hitherto been known to belong to ciliates is no proof that they do not exist. Indeed, we are disposed to say that Dr. Bastian has discovered them.

Several more wonderful transformations are described, as eggs of tardigrades and of a gnat-like fly, developing into ciliated infusoria. Were they not parasites?

Notwithstanding the long period which Dr. Bastian has devoted to his researches, a careful study of the book does not dissipate the doubts one felt at starting. Though many fungi thought to belong to different genera, as *Puccinia* and *Æcidium*, are now known to be dimorphic, and some of the organisms he has observed may prove to be of a similar nature, yet such startling transformations as chlorophyll into other and independent living organisms still require far more proofs than have been given.

"The Origin of Life: its Physical Basis and Definition." By J. B. Burke. 8vo., 351 pp. (Chapman & Hall, London.) 16s.

The author begins by accepting, in a sense, Aristotle's belief that "motion constitutes life," by saying—"Life is, so to speak, a specialised motion." He regards *metabolism* as the indication of life, and adds that it is found in other phenomena outside of physiology, giving as instances luminosity of flames, phosphorescent and fluorescent bodies: "they are of this nature, being due to the building up and breaking down of molecular agglomerations."

Now, one readily admits that the phosphorescence of the glow-worm and *Noctiluca* is a result of chemical actions associated with life; but fluor spar is *not* alive; nor is the flame of a candle, though respiration is chemically identical with combustion.

It seems to us that Mr. Burke here strikes a false note in starting. He appears to consider chemical processes similar to those seen in organisms, as necessarily indicating life; and when they are observed in other bodies, to be therefore a witness to the latter being alive also. But life does not appear to be of the nature of *force* at all; rather it is a *director* of forces. Why should silica find its way to the nails, and lime to the bones, and phosphorus to the brain?

If a kitten and a young hawk be fed on the same animal food, what

decides how the molecules shall be changed and then distributed in building up two utterly different creatures, the one with fur and the other with feathers? There is evidently something *behind* the metabolism which determines all this, and that is Life.

Again, why have organisms varied, so that the world has become peopled with myriads of different animals and plants, if there be not something which *causes* the protoplasm and nucleus to build up tissues and organs different from those of the parents in response to new conditions of life?

To arrive at consciousness, Mr. Burke is "at a loss to find why in these units [assumed to exist in nature] there should not also exist the elements not merely of motion, but also of sensibility and of thought . . . Mind is a property of matter."

Of course all this and a great deal more is pure *a priori* assumption, without a shadow of support from observation; there is an abundance of proof that metabolism of organisms, as well as their variations, are under the *guidance* of life, as they never take place when the organism is dead. He says, "In fact the division of all nature into biological and a-biological is, strictly speaking, not correct." But this begs the whole question. The author has certainly not given anything like sufficient grounds for saying so.

When he asserts "biology, although it has reached the theoretical stage, is merely in the hypothetical subdivision of this stage. No general law has yet been found to prevail throughout the science of life," he betrays a want of knowledge of what has been going on in the study of plant-life for the last twenty years. Ecologists have shown that the fundamental law of evolution is *self-adaptation to the conditions of life*; while natural selection has nothing to do with the origin of species, as Professor Warming shows and declares in his *Lagoa Santa*, and Dr. A. Fleischmann in his *Die Darwinsche Theorie*; so that biology is now, in fact, an "exact science."

Though no bacterium has ever been made artificially, yet he says there are "artificial types of vitality." Here again, Mr. Burke *assumes* that his productions are alive and come into existence "almost as self-made things." But what stands in nature in the place of Mr. Burke or the chemist in the laboratory? These gentlemen were the *directors* of the matter and forces, and so adjusted them that certain results followed. It is of no value to suggest that "pristine mud might have been a more likely culture medium than fish-broth," nor to say that "radium is the seed which grows in the bouillon soil," leading the reader to imagine radium to be a living thing.

Coming to his experiments, he wisely disclaims to have produced spontaneous generation or the living from the non-living. When radium-bromide had been put into sterilised bouillon "signs of growth were visible from ultra-microscopic particles, but they do not grow beyond a certain size." The order of their appearances is, first, dots, then single rings, two rings in contact, or two concentric ovals, with a division across the middle. The outer ring, when broad enough, divides into a sort of Maltese cross, which then goes to pieces.

There is nothing here in the least comparable to a vegetable cell with

its protoplasm and nucleus undergoing karyokinesis. It is much more suggestive of concretionary action, as *e.g.* of the large nodules in the London clay which crack in a more or less similar manner, only the cracks get filled with calcite, so the whole is kept together.

The reader is at a disadvantage, for Mr. Burke says: "Plate II. distinctly shows the existence of a nucleus of a highly organised body." The photograph consists of three similar and homogeneous, dark grey bodies in contact, with a grey fog at one end. No trace of nucleus is visible, and nothing suggestive of a living organism.

Mr. Burke says that "after six or seven days the bodies produced by radium develop nuclei," but no description is given, nor does he allude to vegetable or animal nuclei for comparison, which are far more complicated in their structure than a watch, greatly surpassing it in behaviour. He rules the idea of their being crystals as out of court; but does not appear to draw any comparison with mineral concretions.

Moreover, cells do not break up into organic Maltese-like crosses; and when his "radiobe" is divided by a cross-line (cell-plate?), the nucleus still remains in the middle; no "daughter" nuclei appear in the pieces (daughter-cells?).

A careful consideration of his statements when they are facts, and of his numerous *a priori* assumptions, does not, to our thinking, warrant any conclusion as to the radiobes being alive in the true sense of the word.

P.S.—Since the above was written a paper has been published by Mr. W. A. Douglas Rudge "On the Action of Radium and other Salts on Gelatine" (Proc. of the Camb. Phil. Soc. vol. xiii. p. 258).

He found that if a radium salt is put on sterilised gelatine, a whitish patch appeared and "grew" like a mould for two days. The gelatine liquefies with bubbles of gas. The patch appears to consist of a collection of cells, and after one or two days something like a nucleus could be seen. Other appearances resembled those observed by Mr. Burke.

As barium salt was used, it was tried *without* radium; this, as well as strontium and lead, produced the same results. As gelatine contains sulphur, the growth proved to be an insoluble sulphate, which these metals alone produce. The conclusion is that radium has no specific action on gelatine, the effects being due to the barium acting on sulphur compounds.

"Handbook of Flower Pollination. Based upon H. Müller's 'The Fertilisation of Flowers by Insects.'" By Dr. Paul Knuth. Translated by J. R. A. Davis. Vol. I., Introduction and Literature, with 81 figures in the text. 8vo., 382 pp. (Clarendon Press, Oxford.) Cloth, 18s. net: morocco 21s. net.

Since Müller's work was published in 1888, an enormous amount of material has accumulated, as well as literature. To collate both has taken three years of uninterrupted labour. There will be three volumes. The second will contain observations in flower pollination hitherto made in Europe and the Arctic regions: *Ranunculaceæ* to *Coniferae*. The third volume will deal with observations in flower pollination made outside Europe.

As everyone who studies the subject will not fail to provide himself with this most important and exhaustive work, we need not do more than summarise the general contents.

The first section is a summary of "The Historical Development of Flower Pollination," in which Dr. J. G. Kölreuter is said to be the first to make observations and to point out that visits of insects are necessary for pollination. He commenced his investigations after 1786. At the same time Sprengel began his observations, which he recorded on some 500 plants. The second section begins on p. 28 on "The Present Standpoint of Flower Pollination," containing two sections, as follows:—(I.) Survey of the modes of pollination and of the distribution of the sexes. (II.) Autogamy. (III.) Geitonogamy. (IV.) Xenogamy. (V.) Heterostyly. (VI.) Cleistogamy. (VII.) Parthenogenesis. (VIII.) Flower-groups, viz. water-, wind-, and animal-pollinated flowers. (IX.) Insects that visit flowers, of six kinds. (X.) Methods of research in flower-pollination. Each of these is treated exhaustively. On p. 212 begins the bibliography, which is continued to p. 372, being followed by a list of zoological works, and an index of zoological names contained in them.

"Notes on the Life History of British Flowering Plants." By the Right Hon. Lord Avebury, P.C. 8vo., 450 pp. (Macmillan, London.) 15s. net.

This book may be regarded as a companion volume to Bentham's "Handbook of the British Flora." A student has presumably mastered the structure of flowers, so as to know the species of British plants; but the "Notes," which Lord Avebury has collected, mainly from his own acute observations, form a most interesting addition to the "Flora." He introduces the student to biological and physiological phenomena, which which are of far more interest than the mere knowledge of the names of plants and their classification.

The volume begins with an Introduction of 46 pages, which is followed by notes upon all the species, in the usual order as arranged by Bentham. The author rightly insists on the importance of combining biology with classification, a plan Henslow followed in a less ambitious way in his "How to Study Wild Flowers" (R.T.S.); but Lord Avebury has added a great deal more, though here and there we do not quite see our way to follow him.

The following points were noticed on running through the book in a general way:

In explaining how "fives" arose in floral whorls which form the $2/5$ plan of phyllotaxis, it should have been added that, when the spiral is reduced to a plane, the law of decussation or alternation sets in, and makes the whorls alternate in position. It is suggested that the dissected leaves of submerged plants afford thereby a *larger* surface to the action of the water; but if all the intercostal tissue is arrested in a leaf, only the ribs and veins remaining, the entire surface is *diminished*. The real cause is degeneracy, which applies to the whole plant, in consequence of the protoplasm being surcharged with water: so that if this be made denser with nutritive salts, osmose is set up, the protoplasm loses its water, and then makes complete leaves under water.

We question the suggestion of a coriaceous leaf and spinescence being for a protection against browsing animals. They are merely the responsive result of a dry climate, and occur where no browsing animals live; as furze in a sandy heath, and especially in hot deserts all over the world; while the coriaceous *Proteaceæ* abound on the slopes of Table Mountain.

Holly often grows to 20 feet in height and has spiny leaves to the summit. Moreover, not only will cows destroy a holly bush, but on the young leaves the spines are flexible, like india-rubber, and afford no protection at all.

Again, stings of nettles are no protection against caterpillars; many species live on nettles, and some cows eat them.

On page 18 (the column for "hooked fruits"), such plants as cleavers, agrimony, avens, &c., are all accidentally omitted.

In the illustration of the clover-leaf asleep, the terminal leaflet should overlap the lateral and vertical leaflets. It is the last to move and protects them like a roof.

It is suggested (on page 41) that there is a loss of strength in a sheathing base to a leaf-stalk. We think it is the reverse. In palms, it is composed of strong crossing fibres and completely invests the stem, supplying a leverage to support the massive leaf. Similarly in rhubarb the stipule which sheaths both stem and leaf imitates it.

The silicious surface of grasses is suggested as a protection against snails, but these little creatures cannot harm grasses so much as horses and cows.

It ought to have been shown how the "petals" of hellebore and columbine are formed out of anthers; in the petals of buttercups, transitions occur, as in *R. auricomus*, while those of water-lilies are made of filaments.

The "corms" in the axils of leaves of figwort growing in shady places might have been mentioned.

The "disk" of *Nuphar*, which closely invests the pistil, is omitted.

Radiola is a true native. It occurs abundantly near St. Ives, Cornwall.

The "beak" of *Geranium* is not axial, but composed of the united margins of the carpels, and by breaking away makes the openings on the inner side.

In *Polygala*, the spoon-like apex to the style is *not* the active stigma but the "disk" itself; the former is the second, abortive, one; and it is reduced to a mere point in other genera, as *Muraltia* and *Mundia*.

Under *Epilobium angustifolium* the author might have "generalised" and shown how protogyny, &c., are only relatively constant, varying greatly in flowers under different conditions. (See Buckbean and *Daphne*.)

Astrantia major is not recorded from Herefordshire; only "Ludlow and Malvern" (Hooker). It grows in Stoke Wood, Salop, and only on old Roman quarries in the above places, hence it was presumably introduced from South Europe in the early centuries.

The above observations and some few others only amount to a very small percentage of the notes, which ought to be a very valuable aid to students, and lead them to study flowers in nature for themselves, and so learn all about their life-history on the spot. Such should soon convince them of the uselessness of being content with the name only, a far too common practice.

"Heredity." By C. W. Saleeby, M.D. 8vo., 116 pp. (T. C. & E. C. Jack, London and Edinburgh.) 1s. net.

This book contains fourteen chapters, on such questions as "The Modes of Reproduction," "The Facts and Functions of Sex," "Biometric Study of Heredity," the "Origin of Variation, Mendelism, &c." It is an excellent *résumé* of various writers' views on the subject treated of, but there are some expressions and matters to which we must take exception.

On p. 12, the author says "Variation cannot be reduced to law." Though it is impossible to explain how *Life* makes *variations in structure*, the "Law" is patent enough, viz. that variations arise in direct response to new conditions of life: that is, there is a direct relationship between the new structures and the new conditions: whereas in Darwinism there is none; just as there is none between fragments of a rock broken off by the frost, and the house a man may build with them.* Hence, we quite agree with Dr. Saleeby in saying "there is clear evidence of Purpose behind things."

We are glad to see the vigorous way he exposes and refutes Weismann's theories, as, *e.g.*, "biparental reproduction is a means of preserving the racial type." Geology shows that in due course "racial types" vanish just as individual types do.

The author says: "This theory of natural selection is now a truth questioned by no competent and very few incompetent critics." It is unfortunate that Dr. Saleeby has not studied the writings of present-day ecologists; had he done so he would scarcely have included Dr. Warming as "incompetent," who writes: "I answer briefly to the question which arises, namely, whether these adaptations to the medium should be regarded as a result of natural selection, or whether they owe their origin to the action, in modifying forms, exercised directly by the conditions of the medium. I adopt this latter view. . . . The characters of adaptation thus directly acquired have been fixed."

Dr. Saleeby has here fallen into the common mistake, of assuming as non-existent what happens not to be known by himself.

"Organic Evolution." By C. W. Saleeby, M.D. 8vo., 124 pp. (T. C. & E. C. Jack, London and Edinburgh.) 1s. net.

This little book contains fifteen chapters dealing with the Factors of Evolution, the Evolution of Plants, and Man and his future Evolution, &c. He alludes to Malthus's "Essay on Population" as having suggested "Natural Selection" to Darwin, and observes that the fleetest and the stronger and the craftier animals would be selected, if food were insufficient for all. So far, this is true; but it only refers to the *distribution* by survival, not the *origin* of species. The question is—which Darwin avoided—how came one to be so fleet, or so strong, or so crafty?

Darwin's and Wallace's papers were quite distinct, not "a joint paper" as the author imagines. Moreover, while Darwin based his theory on "Animals and Plants under Domestication," in his own paper Wallace says it is impossible to do so.

With regard to natural selection he rightly observes that (as Darwin

* This is Darwin's simile, *An. & Pl. under Dom.* ii. 431.

said) it "can do nothing if there be no variations to select from," i.e. "favourable" and "injurious." The point herein overlooked by Darwinians is that among any batch of seedlings in the new environment, they are *always all alike*, i.e. "definite" and not "indefinite," according to Darwin; so there is no alternative for selection at all. Hence, when Darwin came to realise more fully the "definite" effects of the "direct action of the conditions of life," he confessed himself wrong, in 1876.

In alluding to a supposed "Directive or Designing Principle," as controlling the whole process of evolution "from the outside," this is a mistake. It is "inside," and a natural law. How can *the same food* make *fur* on a cat and *feathers* on a hawk, if the molecules be not *arranged* differently, and *directed* to their destinations?

The author considers the genealogy of the horse to be a "demonstration" of the truth of evolution. Darwinians constantly refuse inductive evidence in biology and insist on experimental proof; but no inference from palæontology can supply the latter. It is an *equivalent* to, but not in itself, a *demonstration*.

With regard to Professor Weldon's crabs, there is no question of the evolution of a new variety or species. All that his experiment implies is that the smaller, i.e. younger, were better able to resist suffocation than the elder ones; just as a high temperature which the spores can stand will kill adult bacteria &c., or one or two plants may not be killed by frost which destroys all the rest of the same kind.

This little book may thus be criticised on several points, but as a whole it is a capital *résumé* of the principal agents for Organic Evolution.

"Observations of a Naturalist in the Pacific between 1896 and 1899." By H. B. Guppy. Vol. II. *Plant-dispersal*. 8vo., 627 pp. (Macmillan, London.) 21s. net.

This important volume contains thirty-four chapters and an appendix, with illustrations and maps. The first sixteen are concerned with strand floras, and the buoyancy of their seeds or fruits, and causes of their floating.

Mr. Guppy finds generally that plants with an ample supply of water produce buoyancy, whereas truly aquatic and land plants have as a rule fruits or seeds which soon sink.

The adaptation is brought about by *shrinkage* on maturation, chiefly by a loss of water which existed in the immature state. So that in all such, buoyancy is not an acquired special adaptation, but a mere result of the habit of the plant.

The reason why *true* aquatic and *inland* plants fail to have buoyant fruits or seeds appears to be equally the result of habit, though Mr. Guppy does not seem to have hit upon the following suggested interpretation:—In the former the seeds naturally fall into the water, so do not dry up and have air-chambers. In the inland plants the fruits and seeds never had the excess of moisture, which on maturing would allow sufficient air-spaces to enable them to float.

It must be remembered that cellular tissue *per se* is heavier than water, as a waterlogged piece of wood shows; hence fruits and seeds either saturated with water or perfectly dry must sink: i.e. if they have

never shrunk. Chapters II. and III. are upon "the Lesson of the British Flora," and the author deduces the same results: that waterside plants as a rule possess buoyant seeds or fruits.

He quotes Dr. Schimper in attributing to natural selection the differences between coast and inland plants in their adaptation to floating in the same or allied species; but the difference in the amount of water seems to be sufficient to account for them. "The same buoyant tissue is present, but much diminished, in the inland plants," which is just what is to be expected as the result of adaptation.

Chapter XIX. and subsequent ones deal with a variety of interesting subjects, *e.g.* The Physical Conditions of the Islands, The Age of Ferns, The Era of Endemic and Non-Endemic Genera, Beach and River Drift, Viviparous Mangroves, Seed Dispersal and Geological Time.

The reader will find much to interest him in this new and standard work on the subject of which it treats.

"Species and Varieties, their Origin by Mutation." By Prof. Hugo De Vries. Edited by D. T. MacDougal, Assistant Director of the New York Botanic Gardens. 8vo., 847 pp. (Kegan Paul, London.) 21s. net.

This volume contains twenty-eight lectures delivered at the University of California in 1904, grouped under the following headings: Introductory, Elementary Species, Retrograde Varieties, Eversporting Varieties, Mutations and Fluctuations. The meaning of these terms is as follows: De Vries regards "elementary species" as forms which suddenly arise with entirely new characters, no one being predominant, so that a species is like a genus, a name for the whole collection of elementary species. Varieties differ from the above in the loss of some character, or rarely in the acquisition of a character already seen in allied species.

"Fluctuating" is the same as individual variations which are not constant but oscillate about a mean; while mutations are "sports or single varieties, not rarely denominated spontaneous variations, for which I propose to use the term mutations" (p. 191).

In dealing with these, numerous matters of great interest are discussed, such as Darwinism and theories of descent, elementary species in nature and under cultivation, stability and atavism, latent characters, crossing and Mendel's law, monstrosities, double adaptations, usually called "amphibious species," the production of double flowers, peloric *Linaria*, concluding with artificial and natural selection.

"Experiments with Plants." By W. J. V. Osterhout, Ph.D., Assistant Professor of Botany in the University of California. 8vo., 492 pp. (Macmillan, London.) 5s. net.

This book contains ten chapters dealing with the Awakening and the Establishment of Seeds, the Work of Roots, Leaves, Stems, Flowers, and Fruit, How Plants are Influenced by their Surroundings, and Plants which cause Decay, Fermentation and Disease. There are 253 illustrations. The plan of the work is a combination of questions with descriptions, the former to be worked out by the pupils approximately; so that everything is brought under the eyes of the student.

"A First Course in Practical Botany." By G. F. Scott-Elliot. 8vo., 844 pp. (Blackie, London.)

The plan of this book is to supply "Notes" on "Twenty-five Days." Though the matter is for the most part sound and good, we think that there is too much in each "Day" and too disconnected. The first objection is easily remedied, and will doubtless be done by the student in not keeping strictly to the quantity per diem; but the combination of matters treated of will trouble him somewhat. Thus, the second day consists of *Morphology and Climbing Plants*. Two pages deal with the *growth* of roots and stems, which is really physiology and *not* morphology; then follow descriptions of climbing plants (4 pages), a paragraph on the leaf, one on ivy roots, and another on stipules. "Demonstration specimens" comes next, then follows a complete account of the common nettle, *Calluna vulgaris*, *Epilobium montanum*, and dahlia, concluding with "microscopic work." A student is not likely to get all these plants on one and the same day; dahlias, for example, not flowering till late in the season; hence a beginner would be misled if he thought he ought to study all these on his second day. It would be better, we think, to have selected examples following the seasons, as the student will doubtless begin as soon as flowers are open; it would then be possible to follow the principles of classification at the same time; thus, buttercups and wallflowers (*Thalamifloræ*), blackthorn and may (*Calycifloræ*), and so on. We repeat, the way subjects are described is very good, but the treatment is far too heterogeneous for beginners. Another matter for regret is that there is no allusion to ecology, for the accumulation of *facts* herein described should have for their *object* their place in the life-history of plants as grown in Nature. This should have been repeatedly emphasised in describing various structures and their uses. A few statements may be criticised. The author states that flowers are "directly influenced by light" (p. 12) as in *opening*. Mr. F. Darwin attributed this to heat ("Phys. of Plants," p. 219). We have found that tulips open under a gaselier but *not* under electric light, the former being much the hotter; while crocuses expand in *warm* sunny weather in a garden, but not in *cold* weather. The supposed symbiotic nature of *Mycorhiza* has been shown by M. Gallaud to be more of that of a parasite, but the host may subsequently consume it ("Rev. Gén. de Bot." vol. xvii. p. 5 ff.).

In the "List of Experiments" (p. 383) each should be referred to the page on which it occurs. Numbers alone give great trouble.

In describing *Ranunculus Ficaria* (p. 266) the leaves should be "distichous," not "opposite," a natural result of there being only one cotyledon. No explanation is given (on p. 267) as to why three sepals and eight petals prevail, this being the easiest sequence from $\frac{1}{2}$ or $\frac{1}{3}$ phyllotaxis.

The figure of *Campanula rotundifolia* has unfortunately no round leaves at all. The basal leaves should have been shown. It is called 'Bluebell,' i.e. its Scotch name, but it is misleading for English students, whose bluebell is *Scilla nutans*. *Dipsacus* (p. 30) is exstipulate. The author repeats the popular idea that "thorns and spines defend the foliage from grazing animals, which are usually numerous in dry climates." Facts, however, are contrary to this. Spinescence is characteristic of deserts, where browsing animals are conspicuous by their

absence! Spinescence is merely the result of drought. Camels have developed a mouth which is quite indifferent to thorns.

Fig. 28, 3 (p. 59), a dicotyledon, should have a companion figure, to illustrate a monocotyledonous root, in which the root-cap has its own formative cells.

Fig. 50 (p. 115): *i* and *e* should be reversed.

Fig. 111 (p. 28); the arrangement of $\frac{3}{2}$ kind is all wrong—(2) is placed opposite (1) instead of at a distance of 144° ; (8) is omitted, while (6) stands over (1); there should be an intermediate space, as it requires *two* coils.

"*Revolving movements* are characteristic of stems," p. 207. No stems growing in the soil can revolve like a corkscrew, and that, is why Darwin called the movement *circumnutation* or "bowing' around."

"Plant Response as a Means of Physiological Investigations." By J. C. Bose, M.A., D.Sc. With illustrations. 8vo., 781 pp. (Longmans, London.) 21s.

This important book contains 754 pages of 315 experiments &c., and an index. The following will give the reader some idea of the immense amount of work involved: *the classified list of experiments* consists of the following "responses": Differential mechanical, longitudinal mechanical, electric, death, multiple and autonomous, suctional, growth, torsional, uniform, fatigue, polar effects of currents, effect of temperature on excitability and conductivity, effect of chemical agents, geotropism and heliotropism, &c. No analysis can be here attempted; we can only say it will be profoundly interesting to botanists, but too technical, as a rule, for ordinary readers.

"Plants and their Ways in South Africa." By Dr. Bertha Stoneman. 8vo., 288 pp. (Longmans, London.) 8s. 6d.

This is an excellent little book, abundantly supplied with illustrations. In the introduction the authoress wisely observes that in a too great attention to microscopic structures "there is a danger of losing that living interest which a wider outlook into the science alone can afford." She also adds the following remark on "Ecology": "There is yet a third method which considers plants as living things, and the study of their life relations becomes the new standpoint from which they are approached." The book is all on these lines so far as plants of South Africa are concerned. It consists of nineteen chapters dealing with plant life, seeds and germination, growth of bush, stems, and leaves, buds and branches; then follows the physiology of these organs, flowers and their parts, with pollination and fertilisation, fruits and seeds, concluding with classification and the botanical regions of South Africa.

"The Physiology of Plants. A Treatise upon the Metabolism and Sources of Energy in Plants." By Dr. W. Pfeffer. Vol. III. Translated and edited by Dr. J. J. Ewart, 8vo., 451 pp. (Oxford, Clarendon Press.) Half-morocco, 21s. net.

It is impossible to give a detailed account of the mass of matter in this great volume, nor is it perhaps desirable in a Horticultural Journal,

but the contents may be summarised with the general remark that every subject is treated exhaustively and accompanied by an abundance of references, so that the student is provided with a full equipment for the purpose of studying any and every branch of physiology.

There are six chapters, the first four dealing with "movement"; for instance, Chapter I. discusses the forms, causes, and mechanism of movement, Chapter II. is on the movements of curvature; Chapter III. on tropical curvatures; Chapter IV. on locomotory and protoplasmic movements: while Chapters V. and VI. are on the production of heat, light, electricity, and the sources and transformations of energy in the plant.

It may be almost said that the student will find everything that he may want in this encyclopædic work on the subjects dealt with.

"Evolution and Adaptation." By T. H. Morgan, Ph.D. 8vo., 470 pp. (Macmillan, London.) 12s. 6d. net.

The object of this work is to regard De Vries' Mutation Theory as the basis of evolution, instead of Darwin's *Origin of Species by Means of Natural Selection*. It contains thirteen chapters, dealing with the problem of adaptation, the theory of evolution, Darwinism, inheritance of acquired characters, the origin of the different kinds of adaptation, &c.

Mutations, or suddenly appearing species, are supposed to arise from internal impulses, but the author declines to enter into any discussion as to causes of variation. If a mutation should be in adaptation with certain external factors of an environment, it must somehow find its way to them. Hence, as in Darwin's theory, mutations are supposed to arise without any natural law connecting them with suitable conditions of life. Hence he accounts for the degenerate wings of domesticated ducks by thinking "those ducks would have been most likely to remain in confinement that had less well-developed wings."

He accepts neither Darwin's theory nor the present-day explanation of adaptation as made by ecologists, who find they are impelled to see "adaptation" in their plant-surveying.

He asserts that "the effects of climate and food are only transitory factors"; but he omits to add they may become fixed and hereditary by remaining for several generations in the same conditions.

In conclusion, the author's object appears to be to substitute mutations for Darwin's variations with successive additions, so that complete adaptations are acquired at once and the new species is made; but he cannot bring the mutation and a fitting environment together.

"The Horticultural Note Book." By J. C. Newsham. 8vo., 418 pp. (Crosby Lockwood & Son, London.) 7s. 6d. net.

Of all the many books published on gardening subjects none are more worthy of a place in the amateur's or gardener's library than this excellent little work. It is of handy size for the pocket, well bound in a strong pliable cover, and contains very valuable information on most subjects of interest connected with horticulture. It is so comprehensive that only a tithe of the scientific and practical information can be mentioned. Land measurement, horticultural building, garden formation, geological

formations, and soils are all dealt with in a thorough, plain, yet concise manner. A most valuable chapter on "Chemistry of the Garden, and Manures," is one that will be read with interest and instruction, as it tells us plainly the manures best adapted for different soils and crops, and thus prevents the waste of time, money, and labour so frequent now by injudicious manuring. The chapters devoted to fruit, flower, and vegetable culture are excellent, and the lists given of what to grow are reliable, and may be safely followed. Very often a gardener has to take up the duties of forester, and to such the information on the value of timber, measuring it, and much other serviceable matter under the heading of trees and shrubs will supply a long-felt want. The question of how to deal with the host of insect pests attacking the vegetation of the garden and park is gone into thoroughly, and is one of the striking features of the book: this and "Garden Recipes" are very useful. Garden meteorology is also explained in the same clear, interesting style, adopted all through the book. Roses, Ferns, Decorations, &c., &c., are all dealt with, and altogether the information, printing, and method of arrangement leave nothing to be desired. In two cases only did we notice any error in spelling names—viz. *Nymphæa adorata* should be *N. odorata*, and *Osmonda* should be *Osmunda*; however, these small printer's errors do not detract from the value of this really excellent work. A good index is attached, rendering it easy to find any special subject.

"The Uses of British Plants." By Professor Henslow, M.A. 8vo., 184 pp. (Lovell Reeve & Co., London.) 4s. 6d. net.

We have enjoyed reading this interesting little book, and think it will become popular. The illustrations are clear and recognisable, and recall those of the "Handbook of the British Flora." It is well to know the uses of wild plants, though perhaps it is seldom that we make much use of the knowledge obtained. Were we a more salad-loving race, we could make many a good one from wild plants, but so long as the cultivated lettuce is within the reach of all at certain portions of the year, there is not much need to go in search of chicory, valerianella (corn-salad), and the many other wild plants mentioned, that are so often introduced into salads in France and liked so well there. We still see the old-fashioned "herb doctor" in country places, though we may not feel inclined to try his experimental medicines. He would no doubt vastly increase his stock of knowledge by reading "The Uses of British Plants." This book will add greatly to the enjoyment and instruction obtained from summer rambles.

"My New Zealand Garden." By A Suffolk Lady. 8vo., 114 pp. (Elliot Stock, London.) 3s. 6d. net.

A pleasantly written, refreshing little book; a sort of horticultural *hors d'œuvre*, creating an appetite in the reader for further knowledge of the beautiful plants discussed and the land where they can be grown so well. The writer tells us its object is "to let others know the pleasure and mental profit which I have derived from gardening, and also to give a fair account of plants which flourish here." That she has reason to encourage others to follow in her steps may be judged from her statement.

"I have been enabled to squash worries and discard doctors thus far—in fact, my only dose of medicine in twenty years I used to kill weeds." For the second undertaking she can tell us of eight beds of *Lithospermum prostratum*, 7 feet by 5; masses of gentian blue in spring; *Crassula coccinea*, pieces of which, put in 6 inches apart, grew so that their flowers touched each other and became a platform of dazzling colour; *Telopea speciosissima*, from Australia, with heads as large as cricket balls, of red tubular flowers; *Doryanthus excelsa*, as shown in the illustration, with five flowers, stems about 12 feet high; *Hoya carnosae*, which can be wintered out of doors when grown among some other creepers; *Stephanotis floribunda*, killed by frost only twice in twenty years; a row of twenty *Eucalyptus ficifolia* that flowered four years after planting and every summer are covered with scarlet blossoms; *Lapageria*, *Poinciana Gilliesii*, *Lathyrus splendens*, *Plumbago capensis*, *Embothrium coccineum*, *Jacaranda mimosifolia*, *Protea*, *Leucodendron*, *Olearia angustifolia* with bunches of mauve, daisy-like flowers, and *Clianthus puniceus*, all flourishing like the proverbial "green bay tree," and many a treasure is to be had by making a raid on the Bush. Of course there is the complaint most gardeners make—of bad subsoil; our own garden generally has the worst in the whole world, but this one "resembling yellow soap intermixed with ironstone" does appear a real trial. A chapter on the native birds adds much to the interest of the book, and many bright anecdotes and graver thoughts are sprinkled about. Apropos of the futility of certain modern notions, she tells us "A Gourd climbed up a Palm and said: 'How old are you?' 'One hundred years,' said the Palm. 'Then I have out-topped you in one single season,' said the Gourd contemptuously. Replied the Palm, 'You will do more than that in one season—you will die.'" Had we not learnt early in the book that the writer does all except the heavy work herself, we should perhaps deplore the extreme loyalty that took the gardener off suddenly to fight the Boers before he had milked the cow.

"The Forester." By John Nisbet, D.C.E. 8vo. 2 vols., 506 + 642 pages. (Blackwood, Edinburgh and London.) 42s. net.

With the seventh edition of this work, the original "Forester," by James Brown, may be said to have entirely disappeared, even the name Nisbet being substituted in the present edition for that of the earlier compiler. Though, perhaps, savouring more of the theoretical than the practical, the present edition must be admitted by everyone who is conversant with forestry and arboriculture to be a decided improvement on the original; in fact, in point of merit, the two works bear little or no comparison. Originally, Brown's "Forester" consisted of but a single volume, whereas the present edition comprises two, with twenty-seven chapters and 285 illustrations. Chapter I., dealing with "Historical sketches of forestry in this country," is pleasant and instructive reading, and contains a fairly comprehensive account of our forests and woods, from a very early period down to the present time, while the "National economic importance of woodlands" has been carefully and exhaustively prepared, and summarises nearly all that is worthy of record. Part II. of the work, which is devoted to a description of "Our woodland and

ornamental trees," contains a series of concise and well-written monographs of such trees as have been found suitable to our soil and climate. The value of the Weymouth pine as a timber producer in this country has hardly been fully recognised, while the size to which it attains is much underrated. So, too, the profits of afforesting waste lands, which are by no means mythical, having in several well-known instances been carefully recorded in conjunction with the cost of formation and management. Animal and insect pests in relation to our woodlands are well illustrated, though numbers of the latter, which have been carefully tabulated, do little or no damage to trees growing in this country. The formation and management of plantations are clearly set forth in the chapter devoted to that part of the work, though in many of the details opinions will differ greatly, as particular districts may necessitate changes from any stereotyped rules for thinning or disposing of the forest produce. Altogether the book will be found the most elaborate and far reaching of any work that has hitherto been published on the subject, while the numerous well-executed illustrations should go far in elucidating doubtful text.

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 MARGARET R. THOMSON. 2 vols.

DONORS OF PLANTS, SEEDS, &c., TO THE SOCIETY'S GARDEN AT
WISLEY DURING THE YEAR 1905.

- ALLNUTT, Messrs., Chobham Road, Woking. A small bag of lawn grass seeds.
- AMBROSE, Messrs., Cheshunt. Vine 'Melton Constable.' Planted in the collection at Wisley.
- ANTI-BLIGHT Co., Leytonstone. Insecticides. See p. 260.
- BARR, Messrs., Covent Garden. Tomatoes, peas, broccoli, sweet peas (see pp. 237), leeks (259), cabbage (259), potatoes (248), flower seeds, and tulips.
- BATH, Messrs., Wisbech. Carnations (see p. 222), and tulips, of which the trial is not completed.
- BATTRAM, E. H., Port Newydd, Abercynon. Potato. See p. 243.
- BAXTER, W., Woking. Cactus dahlias. See p. 227.
- BELL & BIEBERSTEDT, Messrs., Leith.
- BLACKBURN, E. M., Pulborough. Seeds of hybrid *Lilium giganteum*. Not yet germinated.
- BLISS, A. J., The Maples, Orpington. Seeds of *Securidaca longipedunculata*. Not yet germinated.
- BODENHAM, Miss N., Ivy Lodge, Acton Green, W. Fern spores from New Zealand. Failed to germinate.
- BONAVIA, Dr., Worthing. Vine cuttings. Distributed to Fellows. Pinus and palms growing on in the Garden.
- BONNEY, F., The Hollies, Rugeley. Seedling veronicas. Planted in the Garden.
- BOSCAWEN, Hon. J., Tregye, Cornwall. Ericas, callas, and ferns. Planted in the Garden.
- BOWLES, E. A., Waltham Cross. Herbaceous plants. Planted in the Garden.
- BOYCE, J. W., Welney, Cambs. Potato. See p. 253.
- BRADSHAW, J., The Grange, Southgate. Seeds, bulbs, and plants. Some planted in the Gardens, and others distributed to Fellows.
- BREWER, F. S., Brentwood. Potato. See p. 250.
- BROCK, A. C., Oakfield, Weybridge. Plants of *Primula rosea* and primrose 'Evelyn Arkwright.' Planted in the Garden.
- BROWN, T. W., Kew. Seeds of *Catalpa speciosa*. Plants distributed to Fellows.
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- BURBOUGHS, T. H., London, W. Seeds of *Primula rosea*. Plants distributed to Fellows.
- CADIC, L. E. M., Gravesend. 'La Foudre.' A chemical manure. See p. 260.
- CANNELL, Messrs., Hardley, Norwich. Tomato, peas.
- CARPENTER, W., Yardley Wood, Birmingham. Tomato, received late. Will be tried 1906.
- CARTER, G., Cottenham. Potatoes. See p. 249.
- CARTER, Messrs., 237 High Holborn. Peas, beans, tomatoes, flower seeds (see p. 257), and a pigmy larch growing in the Garden.
- CHAMBERS, B. E. C., Haslemere. Choice trees and shrubs. Growing in the Garden.
- CHATFIELD, Messrs., Southwick, Brighton. Potato. See p. 255.
- CHEAL, Messrs., Crawley. Peas, cactus dahlias. See p. 228.
- CHRISTIE, G. R., Steep, Petersfield. Seeds of Thibetan poppy. Seedlings growing.
- CLEMENT-SMITH, Rev. J., St. Andrew's Rectory, Doctors' Commons, E.C. Plants and seeds. Growing in the Garden.
- CLIBRANS, Messrs., Altrincham. Trees, shrubs, and plants (see p. 258). Planted out and growing in the Garden.
- CLOSE, Miss E., Woodstock. Thirteen orchids. Growing in the Garden.
- COCKER, Messrs., Aberdeen. Violas. See p. 240.
- COLEMAN, W., Tunbridge Wells. Potato. See p. 253.
- COLMAN, J., Gatton Park, Reigate. Caladiums, &c. Plants distributed to Fellows.
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- CROOK, J., Forde Abbey, Chard. Peas, cauliflower (see p. 259), and polyanthus seeds.

- CUTHBERT, Messrs., Southgate. A valuable collection of azaleas. Planted in the Garden.
- DANIEL, Messrs., Norwich. Potatoes. See p. 249.
- DAVISON, G. D., Westwick, Norwich. *Montbretia* 'George Davison.' Planted in the Garden.
- DEAL, W., Kelvedon. Potatoes. See p. 251.
- DE GRAAFF, Messrs., Leiden, Holland. Tulips. Trial not completed.
- DE LUCA, V., Bromley. Seeds of a vegetable marrow, received late. Will be tried 1906.
- DE LUZY FRÈRES, Camberwell. A patent incisor. See p. 260.
- DICKER, C. J., Tunbridge Wells. One tin of "Rusticide." See p. 260.
- DICKSON, A., Messrs., Belfast. Peas and a valuable collection of roses. Planted in the collection.
- DICKSONS, Messrs., Chester. Herbaceous plants and a valuable collection of roses. Planted in the collection.
- DIRECTOR, Royal Gardens, Kew. A collection of seeds. Plants distributed to Fellows. A choice collection of trees and shrubs, planted in the Garden, and tubers of a *Stachys* which are being cultivated.
- DIVERS, W. H., Belvoir Castle Gardens, Grantham. Peas and tomato.
- DOBIE, Messrs., Rothesay. Potatoes, sweet peas, violas. See pp. 249, 257, 240.
- DOBBS, Messrs., Wolverhampton. Potato. See p. 248.
- DOMIER, A., Parkstrasse, Wiesbaden. Unnamed seeds. Plants growing.
- DONOUGHMORE, Dowager Countess of, 84 Sloane Street, S.W. Twenty packets of seeds from Tasmania. Not yet germinated.
- DOUGLAS, J., Edenside, Great Bookham. Carnations (see p. 222) and seeds of carnations and polyanthus. Seedlings growing.
- DU BOIS, Miss S., Hampstead. Seeds of a French poppy of no value (see p. 258), and unnamed seeds from Jamaica. Not yet germinated.
- EYRE, Rev. G. F., Rock, Worcester. Pea.
- FARRER, Sir W. J., Sandhurst Lodge, Berks. Nymphæas in variety. Planted in the ponds at Wisley.
- FERGUSON, G., The Hollies, Weybridge. Plants for the Garden.
- FLETCHER, H., Annesley, Notts. S.R. beans. See p. 259.
- FORBES, W., Knock. Potatoes. See p. 250.
- FRANKLIN, H., Syston. Pea.
- FRASER, J., South Woodford. Plum trees. Planted in the collection.
- FRENCH, G., Uckfield. Potato. See p. 250.
- GALE, A. H., 110 Strand, W.C. Grit-proof syringe. See p. 260.
- GARWAY, Messrs., Clifton, Bristol. Potato. See p. 252.
- GARDINER, Rev. J. Jephson, Highampton, Devon. Seeds from the Himalayas. Not yet germinated, received late.
- GIBSON, J., Teddington. Tomatoes.
- GIBSON, Mrs., The White House, Aldershot. Unnamed rubus. Died.
- GILBERT, Messrs., Dyke, Bourne, Lincs. One hundred and twenty-four anemones ('St. Brigid' and 'King of Scarlets'). Planted in the Garden.
- GILES, T., Salisbury. Tulips. Trial not yet complete.
- GLESTANES, F. G., Berry Hill, Taplow. Seeds of aquilegia. Plants under cultivation.
- GODFREY, W. J., Exmouth. Carnations. See p. 223.
- GOODFELLOW, J., Charmouth. Veronicas. Planted in the Garden.
- GOONEY, T., Daventry. Potato. See p. 249.
- GREEN, R. W., Wisbech. Potato. See p. 251.
- HALES, W., Physic Garden, Chelsea. A collection of seeds. Plants sent out to Fellows.
- HARPER, J., Jersey. Cherry 'Strangs Loggie.' Planted in the Garden.
- HARTLAND, W. B., Cork. Two varieties of apples and *Galega Hartlandi*. Planted in the Garden.
- HARVEY-HART, Miss, Beaconsfield House, Kew. Seeds of *Ruscus hypophyllum*. Failed.
- HINDMARSH, W. T., Alnwick. Alpine plants. Planted on the rockery in the Garden.
- HOBBIES, Messrs., Dereham. Potatoes, dahlias (see pp. 252, 227), and *Lathyrus grandiflorus albus* 'White Pearl.' Planted in the Garden.
- HORDAY, G., Romford. Peas.
- HOGG & ROBERTSON, Dublin. Tulips. Trial not yet complete.
- HOLMES, E. M., 17 Bloomsbury Square, W.C. Seeds of *Pilocarpus microphyllus*, plants distributed to Fellows, and *Celastrus paniculatus*, which failed.
- HOPKINS, Miss, Mere Cottage, Knutsford. Plants of daisies and auriculas. Planted in the Garden.
- HORNE, J., St. Clements, Jersey. Seeds of *Chianthus panicus*. Plants distributed to Fellows.
- HORT, J. N., Chester. Potato.

- HUMPHREYS, T., Botanic Gardens, Edgbaston. Stove plant cuttings and orchids or stock.
- HURST, Messrs., 152 Houndsditch, London. Tomatoes, potatoes (see p. 251), peas and broccoli, the trial of which is not completed.
- JACKMAN, G., Messrs., Woking. A choice collection of trees and shrubs. Planted in the Garden.
- JOHNSON, Mrs., South Croydon. Seeds of an aloe from the Cape, and unnamed seeds from the Karoo. Plants will be sent out to Fellows.
- JOHNSON & STOKES, Messrs., Philadelphia. Tomatoes. Will be tried in 1906. Received late.
- KENT & BRYDON, Messrs., Darlington. Potato (see p. 249), broccoli. Trial not yet completed.
- KERSLAKE, R. T. B., Henbury, Bristol. Potato. See p. 251.
- KIME, T., Marsham-le-Fen, Boston. Potato. See p. 252.
- KIRWAN, L. E., Madras. Seedling crotons, orchids, &c. Under cultivation.
- KRELAGE, Messrs., Haarlem, Holland. Tulips. Trial not completed.
- LAWRENCE, E. H., Stratton, Godstone. Seeds of the 'Balloon Creeper' Plants growing.
- LAWRENCE, Sir Trevor, Bart., Burford, Dorking. Plants for stock, a valuable microscope for the Garden, and seeds, plants of which will be distributed to Fellows.
- LAXTON, Messrs., Bedford. Peas, potatoes, tomatoes. See p. 249.
- LITTLEWOOD, Mrs., Cheltenham. Seeds of hardy plants. Plants distributed to Fellows.
- LLOYD, Mrs. F. G., Langley House, Slough. Seeds of *Ranunculus* and *Celmisia*. Not yet germinated.
- LOW, Messrs., Bush Hill Park. Two plants of *Asparagus medioloides myrtifolia*. Under cultivation.
- LYNCH, R. I., Botanic Gardens, Cambridge. Choice seeds. Plants distributed to Fellows.
- MAARSE, N., Holland. *Astilbe 'Nicolaas Maarse'*. Planted in the Garden.
- MARINDIN, Mrs., Frensham, Farnham. Unnamed seeds and plants. Growing in the Garden.
- MARK, F. M., Hythe. Seeds of *Brassica chinensis*. See p. 259.
- MARSHALL, W., Auchinraith, Bexley. Seeds of *Nicotiana Sanderae*. Seeds and plants distributed to Fellows.
- MARTINEAU, Mrs., Hurst Lodge, Twyford. *Aristolochia* plant. Growing in the Garden.
- MASON, Miss M. H., 5 Vincent Square, S.W. Seeds of an unnamed clematis. Not yet germinated.
- MASON, W., Liddington, Cirencester. Potato. See p. 249.
- MASTERS, Dr. Masters, 41 Wellington Street, W.C. Seeds of hollyhocks and gazanias. Growing on. Tomatoes, cucumbers, melons. See p. 259. Supplementum primum, vols. i. and ii., Index Kewensis.
- MILLER, G. W., Wisbech. Potato, tomato (see p. 253), double flowered primroses, unnamed fig tree. Growing in the Garden.
- MONRO, H. C., Binfield, Bracknell. Seeds from Borneo. Received late. Not yet germinated.
- MONTGOMERY, Miss, Kells, Co. Meath. *Aspidium aculeatum*. Planted in the Garden at Wisley.
- MORTIMER, S., Rowledge, Farnham. Cactus dahlias. See p. 227.
- MUNRO, Mr., Lyme Regis. Seedling myrtles. Under cultivation.
- NATIVE GUANO Co., Kingston-on-Thames. One hundredweight of native guano. Received late. Not yet tested.
- NORTH-ROW, W., Cove House, Tiverton. Potato (see p. 254), shrubs, and herbaceous plants. Growing in the Gardens.
- NOTCUTT, R. C., Woodbridge. A choice collection of trees and shrubs.
- PALMER, W., Andover. Seeds of primula 'Queen Alexandra.' Under cultivation.
- PEARSON, Messrs., Lowdham, Notts. A valuable collection of fruit-trees. Planted in the collection.
- PEMBERTON, Miss H., Bury St. Edmunds. Seeds of a sunflower. See p. 258.
- PENWILL, G., Totnes. Raspberry 'Penwill's Champion.' Planted in the collection.
- PERMIN, Miss H., Trenore, Co. Dublin. *Edwardsia tetraptera*. Plants distributed to Fellows.
- PHILLIPS, F. G., Holmwood, Surrey. Eleven volumes 'Magazine of Botany.'
- PHILLIPS, Mrs. L., Tylney Hall, Winchfield. Seeds of veronicas and plants of Barberton daisy. Growing in the Garden.
- PICKER, G., Hesslewood, Hull. Violas. See p. 241.
- PIERCE, W. R., Canterbury. Strawberry and red currant plants. Planted in the collection.

- PIRIE, Miss, Ripley, Surrey. *Anchusa*, anemones, &c. Planted in the Garden.
- POLLARD, H. B., Evesham. Aster 'St. Ewyn.' Planted in the collection.
- RALEIGH, PANDELL, Winterfold, Cranleigh. *Cypripediums*. Under cultivation.
- READ, G. A., Charlotte, U.S.A. Barley and oats. See p. 259.
- RICHARDSON-POWELL, W. W., Canterbury. Herbaceous plants. Planted in the Garden.
- RIDLEY, G. A., Halstead, Essex. Potato.
- ROBSON, J., Altrincham. *Bouvardia* 'Mrs. McCulloch.'
- ROEMER, F., Quedlinburg, Germany. Flower seeds. See p. 257. Under cultivation.
- ROTHSCHILD, Leopold de, Gunnersbury. Rose 'Conrad F. Meyer.' Planted in the collection.
- RUSSELL, L. R., Richmond. A collection of ericas. Planted in the Garden.
- SANDEMAN, Colonel J. B., Hayling Island. Australian seeds and *Eucommia ulmoides*. Under cultivation.
- SAYAD, S., Ul Hussein, Poona. Unnamed vine cuttings. Under cultivation.
- SCOTT, H., Warminster. Potato. See p. 251.
- SCOTT, W. W., Donnington Manor, Glos. *Viola* unnamed. Under cultivation. Received late.
- SCOTT-ELLIOT, G. F., Dumfries. Herbaceous plants (planted in the Garden), seeds from Chili. Germinating.
- SCREASE-DICKINS, C., Coolhurst, Horsham. Early-flowering gladioli. Planted in the Garden.
- SHARPE, C., Messrs., Sleaford. Peas, potatoes (see p. 248), tomatoes.
- SHOESMITH, Mr., Woking. Cactus dahlias. See p. 227.
- SIMONDS, H. E., Nether Whitacre, Carnations. See p. 64.
- SINCLAIR, M. H., Aberdeen. Potatoes. See p. 250.
- SKIPWORTH, Mrs. G. T., Doncaster. Seeds from a fir cone picked up in Dante's Pine-tum at Ravenna. Seedlings growing on.
- SMITH, F., Woodbridge. Pea, potato. See p. 255.
- SMITH, Messrs. R., Worcester. A choice collection of shrubs. Planted in the Garden.
- SNOOK, F., Pewsey. Potato. See p. 240.
- SORTELLINHO, Baron de, Oporto, Portugal. Choice shrubs and plants for the Gardens.
- SPRAGUE, Miss, Ockham. Seeds of *Boronia megastigma*. Not yet germinated.
- STACEY, W., Dunmow. Carnations. See p. 222.
- STANARD, R., Woolston, Hants. Peas.
- STANLEY, Messrs., 19 Garlick Hill, E.C. One tin of 'Slugdeath.' See p. 260.
- STARK, Messrs., Gt. Ryburgh, Norfolk. *Viola*, sweet peas.
- STEWART, E., 57 Carrington Street, Nottingham. Potato. See p. 251.
- STOOP, Mrs., West Hall, Byfleet. Polyanthus. Growing in the Garden.
- SUTTON, Messrs., Reading. Tomatoes, peas, potatoes (see p. 248), broccoli. Trial not yet completed.
- SYDENHAM, R., Tenby Street, Birmingham. Seeds of Barberton daisy (plants under cultivation), sweet peas (see p. 237), tulips. Trial not yet completed.
- THOROLD, T. G., Syston Park, Grantham. South African plants. Under cultivation.
- TOMLINSON & HAYWARD, Lincoln. Insecticide. See p. 260.
- TRAHERNE, Captain G. G., Cardiff. Seeds of *Linum capense*. Under cultivation.
- TREVOR-WILLIAMS, Mrs., Clock House, Byfleet. Polyanthus. Planted in the Garden.
- TUBERGEN, C. G. van, jun., Zwanenburg, Haarlem. Tulips. Trial not yet completed.
- TURNBULL, T. S., The Woodlands, St. Anne's-on-Sea. Stove plants for stock.
- VEITCH, H. J., East Burnham Park, Slough. Seeds from Thibet and Australia. Under cultivation. Tomato.
- VEITCH, Messrs. J., Chelsea. Carnations (see p. 222), peas, tomatoes, sweet peas (see p. 237), cactus dahlias (see p. 227), and a valuable collection of conifers. Planted in the Garden.
- VEITCH, R., Messrs., Exeter. Plum 'Burbank,' three choice ericas. Planted in the Garden.
- VILMORIN, ANDRIEUX, Messrs., Paris. Eighteen varieties of potatoes. Received late. Will be tested in 1906.
- WAITE, F., Boston. Broccoli. Trial not yet completed.
- WALLACE, Messrs., Colchester. Tulips. Trial not yet completed.
- WABBURTON, J. W., Jersey. Seeds of *Romneya Coulteri*. Not yet germinated.
- WARE, Messrs., W. T., Bath. Tulips. Trial not yet completed.
- WATERER, A., Knaphill, Woking. A choice collection of trees and shrubs. Planted in the Garden.
- WATERER, J., Messrs., Bagshot. Six rhododendron 'Pink Pearl.' Planted in the Garden.
- WATSON, W., Uxbridge. Cuttings of *Eupatorium petiolare*. Under cultivation.
- WEBBER, F., Tonbridge. Potato. See p. 254.
- WEENSTEIN, H., Eisenach. Seeds of alsike. See p. 259.

- WESSTEIN, M. E., Honselersdyk, Holland. Tulips. Trial not yet completed.
- WHEATLEY, T. W., Hexham. Potato, chemical manure.
- WILKS, Rev. W., Shirley Vicarage, Croydon. *Zephyranthus* bulbs. Seeds of *Calla Elliottiana*. Seeds of *Amaryllis*, *aristolochia* and white guava. Plants of all distributed to Fellows.
- WILLIAMSON, J. F., Mallow, Co. Cork. Potatoes. See p. 249.
- WILLIAMSON, Mrs., Ranavie, Weybridge. Seeds from South America. Plants growing on.
- WILLMOTT, Miss, Warley Place, Brentwood. Choice seeds. Plants distributed to Fellows.
- WILSON, A., Kidderminster. Tomato.
- WINNARD, R., Anderton, Chorley. Potato. See p. 250.
- WORSLEY, A., Mandeville House, Isleworth. Stove plants. Under cultivation.
- WUSTENHOFF, J. F., Sassenheim, Holland. Tulips. Trial not yet completed.

PORTRAIT OF SIR TREVOR LAWRENCE.

(See FRONTISPIECE.)

The following letter was sent to all the Fellows in April last :—

Dear Sir or Madam,—At the last Annual Meeting of our Society, held on February 18, the President, Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., completed the twenty-first year of his Presidency.

When he first took up the office the Society was at a very low ebb indeed, having barely 1,000 Fellows, no buildings of its own, and an annually increasing deficit. Owing in no small measure to Sir Trevor's wise guidance, it now has almost 10,000 Fellows, a magnificent Hall and offices in Vincent Square, Westminster, and at each year's end a sufficient balance to make one feel confident for the immediate future.

To celebrate Sir Trevor's twenty-one years of office the Council have resolved to invite all the Fellows to subscribe towards having his portrait painted by Professor Herkomer to place in the Society's new buildings, and also to establish in perpetuity a large gold medal to be called "The Lawrence Medal," to be awarded to exhibits of a specially meritorious character at the Society's meetings, the want of such a medal having been felt for a very long time.

To carry out these projects in a fitting manner, about a thousand guineas will be required, and we hope that you will allow us to put down your name for a subscription.

Signed, on behalf of the Council,

J. GURNEY FOWLER,

Treasurer.

The following Fellows subscribed, and the portrait by Professor Herkomer now hangs in the Council Room, and Mr. Gilbert, R.A., has been commissioned to execute the medal :—

Adams, Herbert J.; Adams, R. H.; Adamson, Miss; Aird, Sir John; Aldam, Miss K.; Alexander, W. C.; Allen, George; Allen, Mrs. Osborn; Allfrey, Mrs.; Anderson, John A.; Apthorpe, W. H.; Arbuthnot, Sir Alex. J.; Arbuthnott, Miss M. F.; Ardern, Mrs.; Ascherson, E.; Ashdown, J.; Ashworth, Elijah; Asaheton Smith, Mrs. ~~Doff~~.

Bain, Wm.; Baker, J. G.; Baker, L. J.; Baker, W. G.; Balfour of Burleigh, Lord; Balfour, C. B., M.P.; Ball, Lt.-Col. E.; Ballantine, H.; Banner, Samuel; Barclay, Col. H.; Barnett, F. H.; Barr, Peter; Barr & Sons; Barry, Sir Francis Tress; Barton, Hon. Mrs.; Basham, John; Bates, Wm.; Bath, R. H., Ltd.; Baxter, Chas. E.; Beckett, Ed.; Beekton, Miss G. L.; Beddome, Col. R. H.; Behrens, Mrs.; Bell, Sir Chas. Morrison; Bell, Wm. A.; Bell, W. Heward; Benecke, Miss A.; Bennett-Poë, John T.; Bennett, Mrs. R.; Benyon, Mrs.; Bergheim, J. S.; Bevan, T.; Biddulph, Miss; Biddulph, Sir Theophilus; Bilney, W. A.; Binning, Lady; Bird, Arthur; Bishop, Maj.-Gen. H. R.; Bisschoffsheim, Mrs.; Blackburn, H. R.; Blyth, P. L.; Bolton, Wm.; Bonavia, Dr.; Bone, Mrs. Mary; Boscawen, Hon. John;

U

Bostock, Fred; Bowles, E. A.; Boxall, Wm.; Boyle, Hon. Mrs. R.; Braby, F.; Bradford, Countess of; Bradshaw, John; Brooke, Lt.-Col. A.; Brooks, Arch.; Brooks, Mrs. L. A.; Brooksbank, Mrs.; Brooman-White, R.; Broome, Joseph; Broughton, H. D.; Brown, E. H.; Bryant, T. H.; Buchan Hepburn, Sir Arch.; Bull, Wm. & Sons; Bunyard, Geo.; Burbidge, R.; Burt, Geo.; Butcher, A.; Bythway, W.

Caldicott, T. P.; Caldwell, Surg.-Major W. S.; Cama, D. P.; Cant, Benjamin & Sons; Caselton, Geo.; Cecil, Hon. Mrs. Evelyn; Challis, Thomas; Chamberlain, Rt. Hon. J.; Chapman, A.; Chapman, Mrs. J.; Charlesworth & Co.; Charrington, A. F.; Cherry Garrard, Maj.-Gen.; Child, James; Chittenden, F. J.; Cholmondeley, Mrs. F.; Christy, J. F.; Church, Prof. A. H.; Church, W. Napier; Churchill, Rev. W. H.; Clark, G. & A.; Clayton, F. C.; Clibrans, Messrs.; Cobb, Mrs. Rhodes; Cobb, Walter; Cobbold, Mrs. Lucas; Cohen, N. C.; Colman, Jeremiah; Cook, E. T.; Cookson, Norman C.; Coomber, Thos.; Cooper, F.; Cowan, John; Cox, Mrs. F. H.; Cox, Hy.; Crawford, Sir Homewood; Crawford, W. H.; Cramp, Miss S. N.; Crawshay, de Barri; Cressy, Miss A.; Cundey, Mrs.; Curling, Rev. J. J.; Curtis, Jas.; Cuthbert, Geo.; Cuthbert, R. & G.; Czarnikow, C.

Darlington, H. R.; Daun, W. H.; Davies, Mrs. C.; Davis, B. R. & Sons; Davis, Miss M. J.; Davison, Miss Louisa; Dawson, Chas.; Deacon, Miss J. B.; Deacon, J. F. W.; Dean, Alex.; Dean, Mrs. C. Montague; Denison, Mrs.; Denison-Pender, Lady; Denning, W.; De Pass, Mrs. John; Dickson & Robinson; Divers, W. H.; Dixon, Chas.; Donoughmore, Countess of; Dormans, Mrs.; Douglas, James; Down, Thos.; Drewett, O. Drewett; Drost, K.; Ducie, Earl of; Duck, T.; Dugdale, Miss Alice.

Eckford, John S.; Edmunds, Mrs. M.; Edridge, Sir Frederick; Edwards, Mrs. E. Ruth; Edwards, Edwin; Egerton, Lady Louisa; Ellis, Mrs. Welbore; Elmslie, Miss Logan; Elwes, H. T.; Emmons, H.; Eversfield, E. M.; Ewart, Miss Mary.

"F" (nom de plume); Falmouth, Viscountess; Farrer, Sir William; Featherby, J. B.; Fellowes, Mrs. Abdy; Fielden, Mrs. E.; Fielden, Mrs. Thos.; Fielder, C. R.; Fisher, J. Haddon; Fisher, Son, & Sibray; Fitzgerald, H. W. Wilson; Fletcher, Chas. E.; Floersheim, Louis; Forbes, Mrs. C.; Forlong, Miss E.; Forster, Mrs. B. C.; Forwood, Wm. J.; Foster, Sir Michael, K.C.B.; Foster, Mrs. R.; Fowler, J. Gurney; Fox, Mrs. B.; Freeland, Miss A.; Fremlin, R. H.; Fry, F. J., J.P.; Fyfe, Wm.

Gibson, T. G.; Gilliat, Mrs.; Gilliat, Mrs. Howard; Gledstanes, F. G.; Godfrey, W. J.; Godseff, J.; Godson, Sir A. F.; Goodacre, J. H.; Goodwin, A. R.; Gordon, Mrs.; Gordon, Hamilton; Gore-Booth, Sir Josslyn, Bt.; Gow, John; Grantham, Lady; Green, Herbert; Grey, Robert; Grier, R. M.; Guest, Lady Theodora; Gumbleton, W. E.

Hall, Mrs. E. S.; Hanbury, Cornelius; Hanbury, Geo.; Hanbury, Sir Thomas; Hansburg, C. B.; Hardcastle, Miss; Hardy, Laurence; Harman, T. R.; Harris, James; Harrison, Thos.; Harrison, T. Fenwick; Hartland, W. Baylor; Hartmann, A.; Harvey, Mrs. C. B.; Haslett, Geo.; Hazelton, E. F.; Healey, Mrs. E.; Heathorn, T. B.; Henderson, Sir Alex., Bt.; Henderson, Mrs. E.; Henslow, Prof. Rev. Geo.; Herlbut, Samuel; Hewitt, J. J.; Hindmarsh, W. T.; Hoare, Mrs. Rolls; Hobbies, Ltd.; Hodgson, Robt.; Hogg, R. Milligan; Holborn, Mrs. A. J.; Holford, Major G. L.; Hollond, F. Egbert; Holman, Lady M.; Hooker, Sir Joseph; Hooper, F. A.; Horan, Mrs.; Hoskyns, A. P.; Hudson, James; Hudson, Wm.; Hughes, Lady; Hulse, The Misses A. and H.; Hunt, Col. J. Maitland; Hurst, C. C.

Ilchester, Dowager Countess of.

Jackson, J. Flower; Jannoch, T.; Jaques, J.; Jefferies, W. J.; Jekyll, Miss, V.M.H.; Jenner, Dowager Lady; Jewell, C.; Joad, Mrs.; Johnson, Mrs. E. W.; Jordan, C.

Keen, Mrs. A. G.; Kelvin, Lady; Kelway, Wm.; Kendall, Bernard; Kennedy, Mrs. A.; Kenrick, T. Arthur; Kerr, Hugh; Keyser, Chas. E.; Kingsmill, Andrew; Kinleside, Rev. R. V. C.; Knight, John; Knobel-Harman, Miss M. H.

Lancaster, A. H.; Lange, G.; Larpent, Maj.-Gen. de H.; Lawrence, C. W.; Lawrence, Mrs. Dorothy; Lawrence, Mrs. L.; Lawrence, The Misses; Law Schofield, Capt. G. W.; Lawson, Sir Arthur, Bt.; Laxton, Bros.; Laycock, Capt.

J. F.; Lazenby, Walter; Legh, Major Hon. A.; Letts, Chas.; Levett, Basil; Lewis, Geo.; Lilford, Lady; Lindley, Lady; Lindley, Miss Julia; Little, Henry; Llangatook, Lord; Llewelyn, Sir John T. D.; Lloyd, Arthur; Lockyer, Lady; Loder, Sir E. Giles; Lodge, Alfred; Lonsdale, Earl of; Lonsdale, Miss C.; Low, Hugh & Co.; Lowther, Hon. W.; Lucas, C. J.; Lucas, C. Phipps; Lucking, W. J.; Lushington, Miss Susan; Lye, R.

McBean, J. and A.; McDonald, F. W.; McDougall, Jas. T.; McGarel, Mrs.; McGaw, Mrs.; MacGregor, James; Mackellar, A.; Mackinnon, Duncan; Macknell, J.; McLeod, J. F.; Mangles, H. A.; Mappin, J. Newton; Marshall, Wm.; Martin, Dr. H. A.; Mason, Miss M.; Massie, W. H.; Master, J. H.; Masters, Dr.; Matthew, Arthur; Mawley, Edw.; May, H. B.; Mayne, James; Medway, Lord; Melchers, C. E.; Melville, Beresford V.; Merrieles, Mrs.; Merritt, F.; Messel, L.; Mitchell, Wm.; Modrae, W. C.; Molyneux, E.; Monro, Geo.; Montagu, Lady; Moore, F. W.; Moore, Miss Carrick; Moore, G. F.; Moore, Gwyn J. E.; Moore, Robert; Moore, T. Y.; Moreing, Mrs. H.; Morgan, J. P. jr.; Morley, Mrs. Hope; Morris, G. F.; Mount-Edgecombe, Lord; Murray, Sir Chas. Wyndham.

Neal, R. E.; Neighbour, Jas.; Newlands, Lord; Nicholson, Geo.; Nix, John A.; Nix, Miss A. L.; Nutting, W. J.

Oakes, Lt.-Col. O. H.; O'Brien, H. Stafford; O'Brien, James; Otter Barry, R. M.

Paine, Standen; Palmer, Mrs. C.; Paterson, Major H. A. L.; Paul, Wm., & Son; Paulin, W. T.; Pawle, F. C.; Paynter, Major C.; Pearks, Hy.; Pearson, A. H.; Pelham-Clinton, Lord Edward; Perkin, L. P.; Perkins, Mrs. Cecilia; Perrin, C. W. Dyson; Perrin, Hy.; Peto, Sir Henry, Bt.; Peto, Sam.; Philbrick, Miss H. C.; Pilkington, Mrs. R.; Pinches, R.; Pitman, Miss E. B.; Plowden, Lady; Pope & Son; Popham, Mrs. Leyborne; Porter, W. R.; Portland, Duke of; Portman, Hon. H.; Powell, R. Chas.; Pownall, G. H.; Probyn, Rt. Hon. Sir Dighton; Protheroe & Morris; Pryor, M. R.; Pulham & Sons.

Quincey, Miss H.

Ralli Pantia; Ramsay, Capt. Jno.; Ramsay, Rev. W. B.; Rankin, Lady; Ransom, A.; Ransom, W.; Ransome, Mrs.; Ransted, G.; Raphael, G. C.; Rattray, T.; Rayleigh, Lady; Reader, Frank; Reamsbottom, W. M.; Redesdale, Lord; Reid, Mrs. Emily; Rennie, Mrs. J.; Reuthe, G.; Richardson, Miss Harriet; Richardson, H.; Riddell, P.; Rigden, W. G.; Roberts, Col. W. Howland; Robertson, Miss M. S.; Robson, John; Rollit, Sir Albert; Rose-Link, Mrs.; Ross, Charles; Rosse, Earl of; Rotch, Miss; Rothschild, Lord; Rothschild, Hon. Walter; Rothschild, Leopold; Rotton, Sir J. F.; Roupell, Wm.; Royds, Col. C. B.; Rutherford, John; Rutter, H. Lee.

St. Maur, Lord Ernest; Salomons, Leopold; Sander & Sons; Saunders, G. S.; Savage, G. H.; Scarisbrick, Sir Chas.; Schneider, Geo.; Schröder, Baron; Seden, John; Sharpin, E. Colby; Shaw, J. E.; Shea, Chas. E.; Sherborne, Lord; Sherrard, G. O.; Sherriff, Mrs. G.; Sherwood, N.; Sibthorp, C. C.; Siah, Mrs. A.; Sidebottom, Col.; Simmons, H. W.; Sitwell, W. H.; Slade, F. W.; Smith, A. B.; Smith, A. Dorrien; Smith, T.; Smith, Martin R.; Smith, W. F. D., M.P.; Sneyd, Miss; Solomon, Jas. H.; Somes, Mrs.; Spooner, S., & Sons; Spragge, Lt.-Col. B.; Stanford, Edw.; Stevenson, Mrs. E. E.; Stone, Mrs. K.; Stone, W. H.; Stotherd, Mrs.; Strauss, E. T.; Strickland, Algernon; Strickland, Sir Charles; Sutherland, Dr. G. S.; Sutton, Arthur W.; Sutton & Sons; Sweet, James; Sydenham, Robert.

Tallents, G. W.; Tankerville, Lord; Tate, Lady; Tate, Alfred; Tatham, Mrs.; Tautz, Arthur; Tiarks, H. F.; Thomas, J.; Thomas, Owen; Thompson, Mrs. Yates; Thomson, D. W.; Thomson, F. C.; Thornely, Mrs. E. A.; Thornett, Mrs. C. R.; Thring, Mrs. A.; Timpson, Mrs. L.; Tinne, Miss B.; Tomkins, Gen. W. P.; Tomkinson, M.; Topping, R.; Tracy, H. A.; Trevelyan, Lady; Trower, H. Seymour; Turner, Arch.; Turton, T.

Urmston, A. B.; Usborne, Mrs. A.

Valpy, F. H.; Veitch, Harry; Veitch, Jas., & Sons; Vivian, H. H.; Voelcker, Dr. J. A.

Walker, James; Walker, J. L.; Walker, W. C.; Walters, T.; Ware, Walter T. Warton, Mrs. R.; Watson, W.; Watts, E. A.; Webb, H. Barlow; Webb, Mrs.

Somerset; Weber, Sir Hermann; Wedgwood, Mrs.; Weller, Major A. T.; Wellesley, F.; Wells, Miss Mary L.; Wells, Miss M.; Wells, W.; Western, H.; Weston, Mrs. Anderson; Whitaker, Mrs.; White, J. T.; Whitehead, Lady; Whiteley, Wm. J.; Wigan, Sir Frederick; Wigan, Mrs. Jas.; Wigan, A. L.; Wilkins, C.; Wilks, Rev. W.; Willard, J.; Wilmott, Miss E.; Wills & Segar; Wilson, Mrs. C.; Winn, Charles; Witts, Mrs. F. R. V.; Witty, J. H.; Wolseley, Sir Charles; Wood, Sir Lindsay; Wood, Miss; Wood, Wm. & Son; Woodward, Geo.; Woolford, J.; Worley, Miss; Wright, S. T.; Wrigley, O. O.

Yool, Mrs. M. T.; Young, Miss E.

NOTES ON RECENT RESEARCH
AND
SHORT ABSTRACTS FROM CURRENT PERIODICAL
LITERATURE, BRITISH AND FOREIGN,
AFFECTING
HORTICULTURE
AND
HORTICULTURAL AND BOTANICAL SCIENCE.

JUDGING by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural and Botanical periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

The Editor desires to express his most grateful thanks to all who co-operate in this work for the very large measure of success already attained, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on was as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal &c. in which the original article appears, taking care to use the abbreviation which will be found on pp. 295, 296.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP
IN THIS WORK.

Baker, F. J., A.R.C.S., F.R.H.S.
 Boulger, Professor G. S., F.L.S., F.R.H.S.
 Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
 Chapman, H., F.R.H.S.
 Chittenden, F. J., F.R.H.S.
 Cook, E. T., F.R.H.S.
 Cooke, M. C., M.A., LL.D., A.L.S., F.R.H.S., V.M.H.
 Cotton, A. D., F.L.S.
 Cox, H. G., F.R.H.S.
 Druery, C. T., V.M.H., F.L.S., F.R.H.S.
 Farmer, Professor J. B., M.A., F.R.H.S.
 Goldring, W., F.R.H.S.
 Groom, Professor Percy, M.A., D.Sc., F.L.S., F.R.H.S.
 Hartog, Professor Marcus, D.Sc., M.A., F.L.S., F.R.H.S.
 Hawes, E. F., F.R.H.S.
 Hay-Currie, C., F.R.H.S.
 Henslow, Rev. Professor Geo., M.A., F.L.S., F.R.H.S., V.M.H.
 Hodgson, M. L., F.R.H.S.
 Hooper, Cecil H., M.R.A.C., F.R.H.S.
 Houston, D., F.L.S., F.R.H.S.
 Hurst, C. C., F.L.S., F.R.H.S.
 Kent, A. H., A.L.S., F.R.H.S.
 Massee, Geo., F.L.S., F.R.H.S.
 Mawley, Ed., F.M.S., F.R.H.S.
 Moulder, Victor J., F.R.H.S.
 Nevill, R. C. R., F.R.H.S.
 Newstead, R., A.L.S., F.E.S., F.R.H.S.
 Rendle, A. B., M.A., D.Sc., F.L.S., F.R.H.S.
 Reuthe, G., F.R.H.S.
 Saunders, Geo. S., F.L.S., F.E.S., F.R.H.S.
 Scott-Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S., F.R.G.S.
 Shea, Charles E., F.R.H.S.
 Shinn, C. H., F.R.H.S.
 Smith, William G., B.Sc., Ph.D., F.R.H.S.
 Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
 Webster, A. D., F.R.H.S.
 Welby, F. A., F.R.H.S.
 Worsdell, W. C., F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used
for their titles.

Journals &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Buletino della R. Società Toscana d'Orticoltura	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéeenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Botany	Jour. Bot.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
Le Jardin	Le Jard.
Lindena	Lind.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. Königl. Bot. Berlin.
Orchid Review	Orch. Rev.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.

Journals &c.	Abbreviated title.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Wiener Illustrierte Garten-Zeitung	Wien. Ill. Gart.-Zeit.
Woburn Experiment Farm Report	Woburn.
Zeitschrift für Pflanzenkrankheiten	Zeit. f. Pflanz.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.

† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

***Echmea lavandulacea*.** By C. H. Wright (*Bot. Mag.* tab. 8005). Nat. ord. *Bromeliaceæ*, tribe *Bromeliæ*; West Indies. A stemless perennial with rosulate leaves 18 in. long, $1\frac{3}{4}$ in. broad. Panicle distichous of many-flowered spikes. Scape, 14 in. long, rosy; bracts rosy; bracteoles green, with white scurf; margins lavender; petals, deep violet.—G. H.

***Æsculus parviflora* Jacq. & Her.** By A. Pucci (*Bull. R. Soc. Tosc. Ort.* 8, p. 222; Aug. 1905).—The synonyms of this plant are: *Æsculus macrostachya* Pers.; *A. nana* Desf.; *Pavia macrostachya* DC.; *P. alba* Pers.; *P. edulis* Poir.; *Macrothyrsus discolor* Spach.

André has stated that, according to the law of priority, it should bear the name *A. parviflora*; but the author prefers retaining *A. macrostachya*.

It is a native of various regions in America, and more especially California and Florida. It is more of a shrub than a tree, but under special conditions may reach the height of 8 metres (10 ft.). It has a luxuriant growth, and emits at its base a large number of suckers. The bark is brown and full of lenticels, of an ash-grey on young branches; the digitate leaves have five, sometimes seven, obovate and elliptical leaflets; dark green above, yellowish-green and tomentose beneath, regularly and finely dentate, with reddish stalklets, which are much swollen at the base. The terminal inflorescences are 40 cm. ($15\frac{1}{2}$ ins.) long; the flowers white, with chocolate-brown stamens. The fruit only matures in warm, temperate countries; in colder climes it either aborts or does not reach proper maturity. The rotund, glabrous fruits contain roundish, slightly depressed seeds, which are rather small for the genus, and are good to eat. The plant prefers a clayey-sandy soil, which must not be humid; it will also live in arid, calcareous soil, but the growth is weak under such conditions.

It is propagated by layering and division; the last mentioned is best, as the layered shoots take too long to make roots. If seeds are available, then that is the best method of multiplication; they should be sown immediately after gathering, or, if that is impossible, they may be kept in good condition in sand until the following spring.—W. C. W.

Agricultural Conference, Queensland, 1905 (*Qu. Agr. Journ.* vol. xvi. part 1, August 1905).—This journal contains a full report of the Agricultural Conference held at Cairns, at which several questions were discussed relating to agriculture in Queensland, including fruit parasites, animal and insect pests, notes on the fruit industry of North Queensland, the Queensland fruit industry, diseases in pineapples, &c., all of which appear to be chiefly of interest to the colonists themselves.—

M. C. C.

***Aleyrodes vaporariorum* (White Fly).** By L. O. Howard (*U.S. Dept. Agriculture, Bur. Ent., Circular No. 57*).—This insect,

generally known in this country as the "snowy fly," appears to be a more destructive pest in the United States than it is here; but our growers of tomatoes, cucumbers, and many other plants should be on their guard against the attacks of this insect. In the United States fumigation with hydrocyanic gas has been found to be the most effectual remedy against this pest. There are, however, various difficulties in the use of this insecticide; if used of too great a strength the plants will be injured, and the exact amount which should be used per cubic foot of the size of the house is uncertain owing to some houses being more tight than others when all the doors and ventilators are closed. Cucumbers and tomatoes seem to be particularly susceptible to this gas. But $\frac{1}{2}$ or $\frac{1}{6}$ oz. of potassium cyanide per 1000 cubic feet of the contents of the house has been used with success, the plants being under the gas for three hours. The other means of dealing with this insect is by vaporising with tobacco extract.—*G. S. S.*

Algicide: Copper as an Algicide and Disinfectant in Water Supplies. By George T. Moore and Karl F. Kellerman (*U.S.A. Dep. Agr. Bull.* 76; April 8, 1905).—Investigations undertaken by the Department with a view to finding some cheap and practical method of preventing or removing algal and bacterial contamination from water supplies have demonstrated the peculiar value of copper as an agent for this purpose. During the summer of 1904 many lakes and reservoirs were treated, and this bulletin contains reports of the results, with definite recommendations in regard to methods of procedure, so that those having to deal with the question of contaminated water may do so to the best advantage.

With reference to the occasional objection to the use of copper as an algicide and disinfectant, it should be sufficient to state that a careful study of all the leading authorities fails to reveal any argument or evidence which can be adduced in opposition to the use of copper for this purpose. Authorities everywhere unite in defending the use of copper as a means of destroying polluting organisms in water, and agree that it can be used with impunity, as advised by the authors.

The conclusion is that experience has demonstrated the practical use of copper sulphate as an agent for the purification of contaminated water.

M. C. C.

Aloe Orpenæ. By S. Schönland (*Gard. Chron.* No. 988, p. 885, figs. 144 & 145, Dec. 2, 1905).—As a foliage plant alone this species will be a decided acquisition to European gardens.—*G. S. S.*

Alphabetical Classification of Plant-names. By Ph. Rivoire (*Rev. Hort.* May 1, 1905, pp. 214–5).—A very natural protest against the frequent alphabetical arrangement of perennial plant-names in catalogues, &c., under M. for Monsieur or Madame, or the initials of Christian names, &c., when it is the surnames of well-known persons which follow and which are more naturally sought for under their surname initials. Numerous plants are named after various members of the same family, and under the arrangement complained of figure under numerous letters instead of being classed under one, thus bringing similar names together.—*C. T. D.*

Anemone japonica, Varieties of. By Jules Rudolph (*Rev. Hort.* Nov. 16, 1905, pp. 542-544; 2 woodcuts).—A descriptive list of 25 varieties, single, semi-double and double, among them some dwarfs.—*C. T. D.*

Angelonia integrerrima. By S. A. Skan (*Bot. Mag.* tab. 7999).—Nat. ord. *Scrophulariaceæ*, tribe *Hemimerideæ*; Brazil and Paraguay. Herb or undershrub, 8 ft. high. Corolla, 7. lines across, pale mauve spotted with purple, broadly saccate.—*G. H.*

Anomalous Dicotyledons, The Embryology of some. By D. M. Mottier (*Ann. Bot.* xix. Oct. 1905, pp. 447-461; 2 plates).—The species investigated were *Actea alba*, *Delphinium tricornis*, *Aquilegia canadensis*, *Syndesmon thalictroides* of *Ranunculaceæ*, and *Sanguinaria canadensis* and *Stylophorum diphyllum* of the *Papaveraceæ*. In all species the development of the embryo was carefully traced from the youngest stages to that found in the ripe seed.

All except *Stylophorum* and *Syndesmon* show a certain well-marked anomalous character. In the two exceptions the embryo is usually typically dicotyledonous.—*A. D. C.*

Aphides. By T. Pengande (*U.S.A. Dep. Agr. Div. Entom. Bull.* 44, pp. 5-23; 4 figs.).—The author, in investigating the aphides occurring on grain, finds there is a great amount of misconception as to the nomenclature of the various species. The European grain louse (*Siphocoryne avenæ* Fab.) lays its shiny black winter eggs in October or later on apple, pear, quince, hawthorn, and plum. They hatch out in March or April, feed on the young leaves and shoots, and produce young in about a month. The second generation reaches maturity during the first half of May, and most acquire wings enabling them to spread. The third, fourth, and fifth generations are produced on the trees, the last reaching maturity about the early part of July. These migrate on to grasses such as wheat, rye, &c., where they remain until October or November. A number of natural enemies are mentioned, and a full description of the various stages through which the insect passes is given. The English grain louse (*Macrosiphum granaria* Buckt.) is next dealt with, the life-history of which is very incompletely known. The German plant louse (*M. cerealis* Kalt.) also feeds on grasses and clover, and is described, except the sexual generation, which is unknown, and a new species of *Macrosiphum* (*M. trifolii*) is described. The last feeds on clover.—*F. J. C.*

Apple Bitter Rot, Control of. By W. M. Scott (*U.S.A. Dep. Agr. Bull.* 98, March 14, 1906; with 8 plates).—This disease, referred to the agency of *Glæosporium fructigenum*, or its latest synonym *Glomerella rufo-maculans*, causes severe loss to apple growers in the United States, estimated in 1900 at ten million dollars. It has for a number of years been under investigation, and although many attempts have been made to control the disease by the ordinary spraying methods, the results have been unsuccessful. Mr. Scott has apparently discovered the reason for these failures, and the results of his investigations indicate that the disease may be successfully controlled at a nominal cost.

The following suggestions are made :

1. Bitter rot can be completely controlled by proper applications of Bordeaux mixture.
2. Four applications, made at the right time, are sufficient to control the disease ; but in order to be sure, one or two additional applications may be necessary.
3. The applications should be made at intervals of two weeks, beginning about six weeks after the trees blossom.
4. It is necessary to spray the trees thoroughly, coating the fruit on all sides with fine mist-like applications.
5. Other diseases, such as scab, leaf-spot, and sooty blotch, may be controlled in connection with the treatment of bitter rot.—*M. C. C.*

Apple, Black Spot or Scab. By D. McAlpine (*Dep. Agr. Victoria, Bull.* 17, 8/04 ; figs.).—A revised edition of Bull. 8 (see *JOURN. R.H.S.* xxvii. 724). The best preventive is spraying with Bordeaux mixture (best results obtained by use of 6 lbs. of copper sulphate and 4 lbs. quick-lime to 40 gallons of water). The copper soda spray (6 lbs. copper sulphate and 9 lbs. washing soda to 50 gallons of water) also gave good results. The proper time to spray is just when the buds are bursting, and this first spray should be followed up by a second about ten days after the first, or, at any rate, immediately after the petals have fallen.

F. J. C.

Apple Crown-gall and Hairy Root. By George G. Hedgcock (*U.S.A. Dep. Agr. Bull.* 90, Feb. 21, 1906 ; 3 plates).—This is a preliminary report, sent out for the purpose of calling the attention of apple-tree growers to the different diseases hitherto known as apple crown-gall, and to endeavour to interest them in the collection of data regarding the predisposition of varieties to these diseases. Hence it is mainly descriptive of two distinct diseases—crown-gall and hairy root.—*M. C. C.*

Apple Maggot, The. By F. W. Card and A. E. Stene (*U.S.A. Exp. Stn. Maine, Rept.* 1904, pp. 191-201).—This pest (*Trypeta pomonella* Walsh) is very troublesome in Rhode Island, tunnelling into the fruit and rendering it worthless. The egg is deposited under the skin of the apple in July by a two-winged fly, which is slightly smaller than a house-fly, and has its wings marked with irregular black bands. After feeding in the fruit, the larva leaves it, enters the ground, and there pupates about one inch below the surface. The destruction of all windfalls is at present the only remedy that is at all efficient, various treatments of the soil having proved quite insufficient to cause the destruction of the pupæ.

F. J. C.

Apple Pests (*U.S.A. Exp. Stn. ; Spec. Bull.* 21, 4/1904).—It is reported that a mixture of arsenite of lime and Bordeaux mixture, used as a spray, proved as effective against codlin moth and "apple fungus" as Paris green and Bordeaux mixture, and very much cheaper. Experiments are being carried out to test the efficiency of a dry dressing of arsenite and Bordeaux mixture, but have not been carried far enough to allow of any recommendation being made.—*F. J. C.*

Apple-rot, Due to Undescribed Species of *Alternaria*. By B. O. Longyear (*U.S.A. Agr. Exp. Stn. Colorado, Bull.* 105, Nov. 1905; 4 plates).—Probably the most common and widely distributed disease of orchard fruits in Colorado is a decay of apples and pears due to an apparently undescribed species of *Alternaria*. In the apple the fungus is confined to the fruit, its most common point of attack being at the blossom end. The affected fruits show a dark purplish-brown, slightly sunken, area at the base of the sepals. The rotting is not so rapid as that caused by some of the soft-rot fungi. Often no external evidence of the presence of the fungus is noticeable until the apple is cut through, when the core cavity is found to be blackened or discoloured. In badly affected specimens the seed cavity is nearly filled with fungous threads, while the discoloration extends into the surrounding flesh of the fruit.

On the pear the fungus attacks the leaves as well as the fruit, producing brown spots of considerable size.

The conidia are blackish-olive when seen in mass. They differ much in size and shape, as well as in the number of cells, from one to ten or twelve, produced in simple or branched chains; when separated they are of a flask-shaped form. Spores may be found by examining the calyx end of infected fruit, but are obtained more readily by placing such fruit in a moist chamber for a few days.—*M. C. C.*

Apples and Cider, Chemical Composition of. By W. B. Allwood, R. J. Davidson, and W. A. P. Moncure (*U.S.A. Dep. Agr. Bur. Chem. Bull.* 88, 1904).—This bulletin gives analyses of varieties of apples suitable for use in vinegar making and of cider made with pure yeasts at the Blacksburg Exp. Station. An account is also given of the use of the hydrometer in estimating rate of fermentation.—*H. J. C.*

Apples, Hardy, for Canadian North-West (*Exp. Farms Rept. Ottawa*, 1904).—*Pyrus baccata* and *P. pruniloba* having proved hardy in the Canadian North-West, these have been much used for crossing with well-known varieties of *P. Malus* in cultivation, and numbers of new forms have been raised, a considerable number of which, though somewhat small, promise to be useful in the colder districts. Descriptions are given of twenty of the most promising, and some are figured.—*F. J. C.*

Apples, Storage of. By S. A. Beach and V. A. Clark (*U.S.A. Exp. Stn. New York, Bull.* 248, 8/1904; 2 figs.).—The bulletin records the results of tests of a large number of varieties of apples stored (1) in a small storehouse without artificial refrigeration, (2) by practical men in cold storage and in ordinary fruit storehouses, and (3) by the station authorities in co-operation with the Department of Agriculture in chemical cold storage. The tests were carried out with a view to determining the ordinary season of ripening and the keeping qualities of the different varieties of apples grown in the station orchards. Lists are given of apples ripening at different times, and others of their behaviour under different conditions of storage, followed by copious notes on the different varieties tested.—*F. J. C.*

Araceæ, Studies in the. III. By D. H. Campbell (*Ann. Bot.* xix. July 1905, pp. 829-846; 4 plates).—No. III. of this series deals mainly with the study of the embryo-sac and the embryology of two species, *Anthurium violaceum*, var. *leucocarpum*, and *Nephtytis liberica*.

A striking fact brought out in the investigation is the extraordinary variability shown in the structure of the embryo-sac itself. In some species the embryo-sac conforms entirely to the angiosperm type. In *Lysichiton* there is a remarkable development of the antipodal cells subsequent to fertilisation. In *Nephtytis* and *Aglaonema commutatum*, the number of nuclei in the mature sac may be reduced to four or even two; definite synergids may be wanting and antipodal cells may be entirely absent. On the other hand, the number of nuclei may exceed the normal and be double the typical number. It is not impossible that some of these variations may be due to pathological conditions.—*A. D. C.*

Arceuthobium occidentale, The Dissemination and Germination of. By George J. Peirce (*Ann. Bot.* xix. Jan. 1905, pp. 99-111; 2 plates).—*Arceuthobium* is a parasite of the Lorantheæ, chiefly remarkable for its explosive fruits.

The author investigated *A. occidentale* as a living plant growing on *Pinus radiata* in California and also by laboratory methods. The anatomical structure of the fruit is described, and the method of explosion; the seeds, it is estimated, may be thrown a length of 25 ft. The germination is also dealt with, the anatomical and physiological features being alluded to; the general characters of the genus are compared with those of other Lorantheæ.—*A. D. C.*

Arnold Arboretum, The. By J. G. Jack (*U.S.A. Hort. Soc. Mass. Trans.* 1904, pp. 59-76).—The Arnold Arboretum is the first of its kind in North America, a portion of his estate having been left in trust by Mr. Jas. Arnold in 1870 for the promotion of some philosophical or philanthropic purpose at the discretion of the trustees. It is situated in the grounds of the Bussey Institution in Boston, under the management of Harvard University. Its area is over 222 acres, and about three-fourths of it are available for planting. The arranged collection contains at present about 1,200 species and varieties of shrubs and vines, and between 400 and 500 species and as many varieties and hybrids of trees. Already considerable numbers of new plants have been introduced to cultivation, and numerous hybrids have been raised, while between 1880 and 1902, 214,650 plants and cuttings and 15,547 packages of seeds were sent as exchanges, and 96,813 plants and cuttings and 6,307 packages of seeds were received.

A herbarium and library are maintained in connection with the arboretum. Between 45,000 and 50,000 sheets are contained in the herbarium, and the library contains about 10,000 volumes and bound pamphlets, a very large proportion of which have been given by Mr. Charles Sprague Sargeant, the director, to whom the arboretum is so greatly indebted.—*F. J. C.*

Arum maculatum and Insects. By Rev. John Gerard (*Journ. Bot.* 512, pp. 231-8; 8/1905).—The substance of an address delivered

at the Linnean Society on June 15, criticising Knuth's description of the cross-fertilisation of the plant by *Psychoda phalanoides*, and stating that the flies are drugged, killed, and absorbed by the arum.—*G. S. B.*

Asparagus madagascariensis. By C. H. Wright (*Bot. Mag.* tab. 8046).—Nat. ord. *Liliaceæ*, tribe *Asparageæ*, Madagascar. An erect shrub, resembling *Ruscus aculeatus* with narrow ternate phylloclades, 1–12 feet high. Flowers small, yellowish. Berries 3-lobed, crimson.

G. H.

Asparagus Rust, Control of. By R. E. Smith (*U.S.A. Exp. Stn. California, Bull.* 172, 1906; 7 figs.).—Dry sulphur applied to the tops of the asparagus has been found to check the rust if it is applied just before the rust is due to appear. Flowers of sulphur applied at the rate of half a sack to the acre, on two occasions, with an interval of one month between, has been found to be an effective remedy. The least satisfactory results were obtained when the dry sulphur was applied to young beds, and it is recommended that these should be sprayed with whale-oil soap and water (6 lbs. to 50 gallons) and then dusted with flowers of sulphur.—*F. J. C.*

Aster philippinensis. By S. Moore (*Journ. Bot.* 509, p. 188; 5/1905).—Description of a new species collected by John Whitehead at altitudes of 5,000–6,000 feet in the island of Luzon; has a perennial, erect, slender habit, and probably white ray-florets.—*G. S. B.*

Aster sedifolius and its Varieties. By F. N. Williams (*Journ. Bot.* 507, pp. 78–89; 3/1905).—A full critical revision of this species, commonly known as *A. acris*, its synonymy and varieties, and their geographical distribution and iconography.—*G. S. B.*

Avocado, The. By G. N. Collins (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 77; plates).—The tropical avocado, miscalled the 'Alligator pear,' is slowly growing in popularity in the northern cities of America, though owing to the difficulties of packing it so that it shall arrive in eatable condition, it is, so far, too expensive a luxury for the ordinary consumer.

The avocado, a variety of *Persea*, was originally met with by the Spaniards on the mainland of America, and was early introduced by them into some of the West Indian Islands. Its cultivation has since spread, at first slowly, but later with much greater rapidity, until it is to be met with in India, Madagascar, Madeira, the Canaries, Samoa, Tahiti, Natal, Australia, Algiers, and along the northern shores of the Mediterranean. In America and the West Indies there are several varieties, which vary much both in appearance and value, and this uncertainty as to what they are actually buying, besides the high price asked and a misunderstanding of the nature of the avocado, which should be used as a salad rather than a fruit, has so far retarded its complete popularisation among North Americans. This bulletin contains descriptions of all the varieties to be met with in South America and the American Islands, some general hints on its culture and propagation, and concludes with a collection of Creole recipes for the preparation of the fruit.—*M. L. H.*

Borer, Flat-headed (*Chrysobothris femorata*). By A. J. McClatchie (*U.S.A. Exp. Stn. Arizona, Bull.* 47, 11/1903; fig.).—The larvæ of this beetle attack apple, pear, quince, plum, peach, cherry, ash, elm, maple, box-elder, sycamore and willow trees, boring into bark, and sometimes girdling the tree, causing its death. Sickly and newly planted trees are usually selected, and the eggs are laid in April and May. A wash of the following is recommended: Dissolve $\frac{1}{2}$ gallon soft soap in $\frac{1}{2}$ gallon hot water, add $\frac{1}{2}$ pint carbolic acid. Mix, and then add 5 gallons of warm water and enough lime to make of about the consistency of paint. Stir in $\frac{1}{4}$ lb. Paris green.

Apply to trees in April to prevent the beetles from depositing their eggs.

Protecting the trunks of the trees with newspaper is also suggested.

F. J. C.

Bowkeria Gerrardiana. By S. A. Skan (*Bot. Mag.* tab. 8021).—Nat. ord. *Scrophulariaceæ*, tribe *Cheloneæ*; Natal. An erect shrub, 8–10 ft. high, leaves 2–6 in. long. Inflorescence, cyme; flowers, 8–9 lines long, pale yellow.—G. H.

Brachyglottis repanda. By W. B. Hemsley (*Bot. Mag.* tab. 8057).—Nat. ord. *Compositæ*, tribe *Senecionidæ*. New Zealand. A shrub or small tree, 8–20 ft. high. Flower-heads numerous, 2–3 lines diameter in pyramidal panicles. Flowers 8–12 in a head, white.—G. H.

Brunsvigia gigantea. Anon. (*Gard. Chron.* No. 952, p. 181, fig. 78, and Supp. 25 Mar. 1905).—This fine plant, more properly known as *B. multiflora*, has generally in this country to be grown under glass, if not to protect it from the frost, to enable the bulbs to ripen sufficiently to produce flowers, but it flowered last July in Lord Walsingham's garden near Ventnor, at the base of a rockery, very grandly, the umbel measuring no less than 37 ins. across. The plant is well figured in the Supplement.—G. S. S.

Bulbophyllum crenulatum. By R. A. Rolfe (*Bot. Mag.* tab. 8000). Nat. ord. *Orchidaceæ*, tribe *Epidendreæ*; Madagascar. An epiphyte, scapes 5–6 in. high, raceme drooping, 2 in. long; dense-flowered, dull purple. Flowers 2 lines long.—G. H.

Burbidgea schizochella. By C. H. Wright (*Bot. Mag.* tab. 8009).—Nat. ord. *Scitamineæ*, tribe *Zingibereæ*; Malaya. Stem, 9–15 in. high; leaves 5 in. long; panicles 9–12-flowered; flowers orange-yellow.

G. H.

Cabbage Hair-worm (*Mermis albicans*).—By F. H. Chittenden (*U.S.A. Dep. Agr. Bur. Entom. Circ.* 62).—A white hair-worm from 2 to 8 inches in length has been found among the leaves of cabbages, &c., and numerous rumours of its poisonous properties have circulated to the detriment of market-gardeners, who could not find customers for their stock. It is pointed out that these worms, which are internal parasites of insects, are quite harmless to human beings or domestic animals.

F. J. C.

Cacalia tuberosa. By W. B. Hemsley (*Bot. Mag.* tab. 8022).—Nat. ord. *Compositæ*, tribe *Senecionideæ*; North America. A robust perennial scabious herb, leaves heathery, ovate, 5-7-ribbed, with stalks 2 ft. long. Flower-heads 5-flowered, corolla and anthers yellow.—*G. H.*

Cacao, Fungoid Diseases. By L. Lewton-Brain, B.A., F.L.S. (*W. Ind. Bull.* vol. vi. No. 1, 1905).—This paper records the stem diseases, pod diseases, and "thread blight" affecting the cacao tree, with some additional information on the latter under the designation of "witch broom," and concluding with a bibliography.—*M. C. C.*

Cacao, Insects attacking Cacao in the West Indies. By Henry A. Ballou, B.Sc. (*W. Ind. Bull.* vol. vi. No. 1, 1905).—The insects enumerated are the cacao beetle, cacao thrips, and other insects, with suggestions as to their destruction.—*M. C. C.*

Cactus Scab (*Diplodia Opuntia*). By G. Massee (*Gard. Chron.* No. 972, p. 125, fig. 44, Aug. 12, 1905).—The identity of this fungus has remained in doubt until the present time, "when the fungus was found in fruit by Mr. A. Worsley, who has had the disease under observation for many years." The fungus causes a discoloration of the leaves round a number of minute wart-like growths, which are sterile. No means of destroying this pest is mentioned.—*G. S. S.*

Cadaloea spectabilis. By C. H. Wright (*Bot. Mag.* tab. 7992).—Nat. ord. *Scitamineæ*, tribe *Zingibereæ*; Tropical Africa. This has very large yellow flowers, with obovate, bright green, red-edged leaves, 2-9 in. long and broad.—*G. H.*

Calla, Soft Rot of. By M. C. C. (*Gard. Chron.* No. 941, p. 9, Jan. 7, 1905).—A short account of this disease, which has been found to be caused by one of the bacteria (*Bacillus aroideæ*), is given by Dr. Cooke. This organism also infests such plants as the carrot, potato, turnip, radish, cabbage, and cauliflowers, and the fruits of the tomato, egg-plant, and cucumber.—*G. S. S.*

Camellia-tree of Pillnitz (*Die Gart.* No. 17, p. 203, Jan. 21, 1905). In Saxony this tree is as famous, as the old vine of Hampton Court is in this country. It is one of the oldest of double-flowered camellias in Europe, producing yearly many thousands of flowers. Though sheltered by hills on the banks of the river Elbe, the climate is very severe, a wooden house is built over the tree every winter and heated when absolutely necessary. This house caught fire accidentally, and it was feared the tree was killed. In a note, dated November 11, the tree is said to be showing signs of a vigorous new growth.—*G. R.*

Canada, Fruit in (*Exp. Farms Rept., Ottawa*, 1904).—The report by Mr. W. J. Macoun on experimental fruit-growing in Canada contains some useful information on trees hardy in certain districts of Canada, reports on shipments to Europe, reports on seedling fruits, diseases of grapes in Ontario, and on cover crops for orchards (horse-beans were found useful, since they are killed in winter and may easily be

ploughed in—clover and vetch are not quite so useful in Canada). Some other crops are also dealt with.—*F. J. C.*

Canning Fruits and Vegetables, Notes on. By W. B. Allwood (*U.S.A. Exp. Stn. Virginia, Bull.* 146; 8/1903).—A general account of the principles underlying the process of canning is given. Particular directions as to canning tomatoes, beans, sugar corn, apples, and plums are given in full detail.—*F. J. C.*

Cassia granitica. By E. G. Baker (*Journ. Bot.* 506, pp. 45-6; 2/1905).—Description of a new species—a fair-sized, free-flowering tree—allied to *C. abbreviata*, with golden-yellow blossoms, found by Mr. Eyles on granite at an altitude of over 4,400 feet, near Buluwayo.—*G. S. B.*

Catasetum Christyanum ♂. By R. A. Rolfe (*Bot. Mag.* tab. 8007). Nat. ord. *Orchidaceæ*, tribe *Vandee*; Amazon district. A tufted epiphyte, about 1 ft. high. Flowers 4 in. across, light green, heavily blotched with red-brown; lip 8-lobed; margin deeply fimbriate.—*G. H.*

Cellular Structures, Evolution of. By O. F. Cook and W. T. Swingle (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 81, 1905).—Emphasises sexuality as a mechanism of evolution. Species are to be interpreted as sexual phenomena, come to be what they are only through symbiosis; that is, as groups of interbreeding individuals, travelling together along the evolutionary pathway.—*F. A. W.*

Chestnut Weevils, etc. By F. H. Chittenden (*U.S.A. Dep. Agr. Div. Entom. Bull.* 44, pp. 24-43).—The loss arising from the attacks of weevils in sweet chestnuts amounts to from 20 to 25 per cent. of the whole crop. The two weevils causing most damage are *Balaninus proboscideus* Fab. and *B. rectus* Say. Full descriptions of all stages of these insects, and accounts of their habits, are given. The hickory-nut weevil (*B. caryæ* Horn.) is also described. The beetle bores through the outer husk of the nut with its long proboscis, feeding on the young growing nut; eggs are then deposited in the hole, and the larvæ feed on the substance of the nut. When full fed the larvæ make their way into the soil, where they hibernate and become pupæ the following year, emerging as perfect insects in June or July. Fumigating with carbon bisulphide, plunging the nuts in boiling water, or heating to between 125° to 150° as soon as gathered destroys the contained larvæ and checks further injury to the nuts, without in any way affecting the nuts themselves. The best preventives are careful harvesting and co-operation in order to give attention to wild chestnuts in the vicinity of the plantations. A note is also given on the acorn moth (*Holocera glandulella* Riley).

F. J. C.

Chinese Note-Book, Leaves from a. By E. H. Wilson (*Gard. Chron.* No. 962, p. 337, fig. 138, June 3, 1905, and continued in several subsequent numbers).—In this series of articles Mr. Wilson gives an account of his wanderings in Central China in search of plants for Messrs. Veitch & Co. of Chelsea. In these abstracts, however, it is

impossible to do more than call attention to these most interesting articles.—G. S. S.

Cicer arietinum. By C. Sprenger (*Bull. R. Soc. Tosc. Ort.* 7, p. 192; July 1905).—No one knows the native place of origin of this plant. No one has ever found it growing wild. It was cultivated by the Greeks and Romans; Pliny mentions the threshing of peas in autumn, but this can only refer to the chick pea, as peas proper mature at Naples in April or May. The same may be said in regard to the allusion by Homer. In India it is one of the chief articles of food, being grown in large quantities and consumed, green and dried, everywhere. It is cultivated throughout the Orient, and occurs everywhere in temperate and tropical Asia. Even China cultivates it, and had already imported it in the fourteenth century, according to Bretschneider. It is found in Africa, especially in the north, being common in Morocco, as in Spain, where the peas form the primary object of rural culture and are daily consumed in enormous quantities. The famous "pucherò" of the Spaniards, a daily dish, is chiefly composed of Chick Peas, which are cultivated in Asturias, Leon, and New Castile. They are also cultivated in large quantities in Italy.

About 50 varieties are scattered over the globe. They are of all colours. A hectolitre (22 gall.) weighs from 70 to 85 kilos (140 to 170 lbs.).

In Italy the sowing of 60 to 70 kilos. (120 to 140 lbs.) per hectare (2½ acres) suffices on a rich calcareous soil. The straw makes good feeding for sheep and goats. No leguminous plant can fight the weeds better than this one; every weed appears to avoid it. It covers the whole ground with its horizontally growing branches, beneath which all else dies.

In Italy it is eaten chiefly dry, but also green, especially by boys. Roasted and ground it serves as a substitute for coffee, especially the red and black varieties.

It grows in calcareous and sandy rather than in clayey soil. The dews of night suffice it for moisture, hence it is one of the few plants which can be grown in the interior of Australia.—W. C. W.

Cider and Cider-making. By W. B. Allwood (*U.S.A. Exp. Stn. Virginia, Bulls.* 186, 187, 188, 189; *U.S.A. Dep. Agr. Bur. Chem. Bull.* 71, 1902-1904).—The author spent some time in England, France, and Germany, investigating the making of cider. He remarks that a very large quantity of unmerchantable apples might be made into cider. It is estimated that the apple crop of the United States averages nearly 100,000,000 bushels per year, of which a considerable quantity is wasted, used for canning, making marmalades, butters, jellies, &c., or in the preparation of dried fruit. The varieties of cider made in different countries, e.g. "pure juice," "marchand," and "boisson" or "petit cidre" in France, are discussed, and a description of the chief cider-producing districts is given, the general aspect, climate, and soil being dealt with. The nature of the soil seems to have a marked influence on the cider; e.g. M. Truelle says: "We are led to think that the apples harvested from a soil where lime is in excess, as upon the great colite plains of Caen and of Falaise, are less sugary than those others which grow upon an argillaceous soil. The cider produced from fruit grown upon our limestone

plains becomes acid at an earlier stage, and is very inferior in quality to that made at Bessin and the regions of the chalk substrata like Lisieux and Pont-l'Évêque." An abundance of flint nodules was everywhere characteristic of the best lands.

Cider Apples.—A large amount of work has been done by French investigators during the past thirty years in classifying, describing, and analysing the fruits of the hundreds of seedling apples found in the cider orchards. Much less has been done in England and in Germany in this direction, but work on these points is in progress. The French value the apples according to the amount of (1) sugar, (2) tannin, (3) mucilage, and (4) acid which they contain, while a fine flavour and fragrance are also looked for. The Germans pay greater attention (and probably rightly) to the acid contents, demanding as much as .6 to .8 per cent. The American apples, as a rule, contain too little tannin. Many analyses of apples of various countries and different varieties are given, and the author considers that "if seedlings had been grown from them (the existing English fruits) and well selected as in France, England would to-day have as good a race of cider apples as France has."

An account is then given of the harvesting, transportation, and storage of cider apples in the different countries visited, and a comparison made of the methods seen there with those adopted in America, and this is followed by a very complete description of the various methods, old and new, of crushing the fruit, the treatment of the must and its fermentation, the clarifying or filtering of the cider, and its final storage.

F. J. C.

Cirrhopetalum breviscapum. By R. A. Rolfe (*Bot. Mag.* tab. 8093).—Nat. ord. *Orchidaceæ*, tribe *Epidendrea*; Malaya. An epiphytic herb with a creeping rhizome. Flowers, 2 in. by 1½ in., purple, except the lip, which is yellow, spotted with purple.—G. H.

Citrous Creations, New, in America. By H. J. Webber and T. Swingle (*U.S.A. Dep. Agr. Year Book*, 1904, p. 221; plates).—Description of studies and experiments extending over several years of hybridisation for the purpose of raising more varied and improved sorts of citrus fruits. It is pointed out that fruit trees of this sort being *clous*—that is, varieties which are propagated by bud-grafts and cuttings—a hybrid of value, when once secured, can be thus propagated indefinitely without waiting for fixation, as is necessary with plants propagated by seed. Having regard to the severe frosts encountered in some parts of the United States, the experimenters endeavoured to obtain hardier varieties by hybridisation. A minute description, with coloured plates, is given of the new group of citrus fruits called citranges, more especially the 'Rusk citrange' and the 'Willits citrange.' The former has been obtained by crossing the common orange (used as the female parent) and the trifoliate orange (used as the male parent). The trees of this variety are far more hardy than the common orange, and produce a fruit intermediate in qualities between the two parents. The latter variety has resulted from a hybrid of trifoliate orange with pollen of the common orange, being thus what is known as a reciprocal hybrid of the 'Rusk.' The 'Willits

'citrange' makes a beautiful vigorous-growing tree, and the fruit has more nearly the flowers of the lemon. The tangelo is a new group of loose-skinned fruits. It is a hybrid between the pomelo and tangerine, having the easily removable rind of the tangerine and a flavour somewhat sweeter than the pomelo. The experiments by the writers seem to have been most interesting, and productive of far-reaching results.—V. J. M.

Cliftonia, History of. By J. Britten (*Journ. Bot.* 514, pp. 282–284; 10/1905).—A discussion on the introduction of this shrub, now to be known as *Cliftonia monophylla*, but previously referred to *Ptelea* and distributed as *Walteriana caroliniensis*.—G. S. B.

Clover and Alfalfa, Experiments with. By J. H. Shepperd (*U.S.A. Exp. Stn. North Dakota, Bull.* 65).—The results of some experiments as to the best sort of clover to grow for hay, and the best way of managing the crop in the severe climate of North Dakota. The shelter of some corn stubble, preferably that of wheat, was found of great advantage to the growing clover, and the best method of sowing appeared to be to drill the wheat in rows running north and south, and the clover seed in $1\frac{1}{2}$ to 2 inch deep drills (not broadcast) from east to west.

To regulate the rate of sowing, a mixture was made of 8 lbs. of timothy grass seed, 5 lbs. red clover seed, and 4 lbs. rough salt per acre, which proved most satisfactory. In a very dry season, when the salt did not properly adhere to the seed, coarsely ground barley was substituted.

The mixture of timothy grass with the clover produces a larger first crop, but if a second crop were taken pure clover would give the best results. Clover grown in North Dakota from imported or southern-grown seed produces very little fertile seed.

Mammoth clover has so far proved less able than either the common or the medium red to withstand the severe winters of this region, and the formation of a thin crust of ice over the crop either by flooding or in wheel tracks caused by carting operations seems fatal to any variety.

One essential to the growth of clover in nearly every soil is the presence of the nitrifying bacteria which produce tubercles on the roots of the plants, and if these are not naturally present they must be supplied, either by scattering infected soil from an old clover patch, or by applying bacteria from pure cultures, such as are now being sent out by the Bureau of Plant Industry in America.

The experiments with alfalfa at the station indicate that it may ultimately prove a successful crop in North Dakota, but the conditions are not sufficiently favourable to justify farmers in devoting much land to it as yet.—M. L. H.

Cocoa-nut Palm, Bud-rot Disease (*W. Ind. Bull.* vol. vi. No. 8, 1905).—This is a summary of reports on this disease, which, under different names, has been recognised since 1875 in the West Indies and Central America. At first, and for some time, it was called "fever." The conclusion arrived at by the U.S. Department of Agriculture is that the primary cause of the disease is a parasitic fungus, described by Dr. M. C. Cooke, in 1876, on a diseased palm sent from Demerara, and called

Pestalozzia palmarum. The remedy suggested is the application of Bordeaux mixture.—*M. C. C.*

***Colchicum hydrophilum*.** By C. H. Wright (*Bot. Mag.* tab. 8040). Nat. ord. *Liliaceæ*, tribe *Colchicææ*. Asia Minor. Corm 1 in. in diameter, leaves appearing with flowers. Flowers 3-5 in clusters, rose-colour.—*G. H.*

***Colchicum libanoticum*.** By C. H. Wright (*Bot. Mag.* tab. 8015).—Nat. ord. *Liliaceæ*, tribe *Colchicææ*; Syria. Flowers, 2-8, white or pale rose.—*G. H.*

***Colchicum Steveni*.** By C. H. Wright (*Bot. Mag.* tab. 8025).—Nat. ord. *Liliaceæ*, tribe *Colchicææ*; Syria and Arabia. Corm ovoid, 1 in. long. Leaves appearing with the flowers, linear. Flowers, 3-10, in a fascicle, pale rosy lilac.—*G. H.*

***Coleus shirensis*.** By N. E. Brown (*Bot. Mag.* tab. 8024).—Nat. ord. *Labiataæ*, tribe *Ocymoidææ*; British Central Africa. Herb 3 ft. high, leaves and petioles 3-6 in. long. Corolla $\frac{3}{4}$ in. long, violet.—*G. H.*

Composites, Double-flowered. By Henri Theulier fils (*Rev. Hort.* May 16, 1905, p. 242).—The seed from the centre of the flower should be rejected, and only that be sown which is produced on the outer two-thirds. The central ones are apt to produce single or only semi-double flowering plants.—*C. T. D.*

Coniferæ, Variegated. By J. C. Bagshot (*Gard. Chron.* No. 974, p. 164; Aug. 26, 1905; continued and concluded in No. 975, p. 179, Sept. 2, 1905).—Variegated Conifers are said by the author of this paper not to be cultivated to the extent which they deserve, and he says that "it is proposed in the following notes to mention either those which are easy to grow or are of such merit as to warrant a little more care and attention being bestowed upon them." A short description of each species is then given.—*G. S. S.*

***Cotoneaster rotundifolia*.** By W. B. Hemsley (*Bot. Mag.* tab. 8010).—Nat. ord. *Rosaceæ*, tribe *Pomeææ*; North India. A sub-erect, densely branched shrub, 3-4 ft. high; leaves $\frac{1}{2}$ in. across; flowers pink and white, $\frac{1}{2}$ in. diameter; fruit top-shaped, $\frac{1}{2}$ in. long, deep crimson.—*G. H.*

Cotton, Fungoid Diseases of. By L. Lewton-Brain, B.A., F.L.S. (*W. Ind. Bull.* vol. vi. No. 2, 1905).—This is a summary of the diseases which attack the leaf, boll, and stem of the cotton plant, but is directed chiefly to the disease called "black boll," the cause of which has not at present been identified; and the only foreign organism present in diseased bolls was a short, rod-shaped, non-motile bacillus, which was constantly present in diseased tissues.—*M. C. C.*

Cotton, Insect Pests of. By Henry A. Ballou, B.Sc. (*W. Ind. Bull.* vol. vi. No. 2, 1905).—This communication describes the various known insect pests of the cotton plant, and concludes with the descrip-

tion of a new insect enemy, which has been named *Porricondyla (Epidosis) gossypii* n. s., the larvæ of which live in the cambium layer of cotton plants, first found in Barbados, and known as "red maggot."

M. C. C.

Cotton Plant, Weevil-resisting Adaptations of the. By O. F. Cook (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 88, pp. 88, 1906; 10 plates). A very interesting paper, showing that the cotton plant "is in a high state of adaptive specialisation in its relations with its now famous insect enemy, the boll weevil." The author finds adaptations calculated to avoid the weevils by general habits of growth, to exclude weevils, to attract the weevil-eating kelep, and to prevent the development of the weevil larvæ even after the eggs have been laid. Different varieties of cotton show the special adaptive characters in different degrees, the older ones being shared to some extent by all the varieties. It is estimated that when the boll weevil shall have spread over the whole cotton-producing area of the States the loss due to it will be at least \$1,000,000 a day. Cultivation with the aim of increasing the degree of resistance to the attacks of the boll weevil will, therefore, be of great importance.

F. J. C.

Cotyledon elegans. By N. E. Brown (*Bot. Mag.* tab. 7998).—Nat. ord. *Crassulaceæ*; Mexico. A suffruticose succulent perennial, with leaves in rosettes. Corolla about 1 in. long, $\frac{1}{2}$ in. diam., clear red without, yellow within.—G. H.

Cotyledon insignis. By N. E. Brown (*Bot. Mag.* tab. 8086).—Nat. ord. *Crassulaceæ*. Nyasaland. Succulent plant, 2 ft. high. Cymes from axis of upper leaves, 1-3-flowered. Corolla-tube $1\frac{1}{2}$ in. long, light reddish on yellow ground.—G. H.

Cranberries, Report of Investigation on. By A. R. Whitson, E. P. Sanstein, L. P. Haskins, H. Ramsey (*U.S.A. Exp. Stn. Wisconsin, Bull.* 119, 1905; 87 figs. and map).—An outline of the experiments on cranberry culture is given. The cranberry requires a light sandy or peat soil, the latter being preferable for many reasons; on clay the plant grows well, but fruits little; on the whole, the coarser and deeper the peat the better the growth and fruit. One of the greatest drawbacks to cranberry cultivation is the occurrence of cold waves and frosts, and experiments show that sanding the surface of the cranberry beds, keeping down weeds, and drainage as well as flooding with water are means of protection against frost. Plans are given of arrangements for flooding and draining the land and for storing water in case of need. Instructions are given for the preparation of the ground, for planting, and for the future care of the young plants. The berries are gathered by hand or by means of rakes, the latter method being the better when pruning has been systematically carried out. The berries, if properly sorted and packed, may be kept in cold storage the year round. A very large number of varieties are in cultivation, and trials are proceeding with these, while endeavours are being made to raise improved varieties.

The principal fungal disease is due to a species of *Rosellinia*, the life

history of which is not fully known ; investigations concerning it are in progress. A large number of insects are known to attack the plant, and descriptions and figures of many of these are given. The bulletin concludes with descriptions of a number of weeds found growing in cranberry bogs, with means to be adopted for their eradication.—*F. J. C.*

Crane Fly, or Daddy Longlegs. By R. N. (*Gard. Chron.* No. 948, p. 84, figs. 16 to 21, Jan. 1, 1905).—The habits and customs of this very common and most destructive pest are fully dealt with in this very interesting paper. Rooks and black-headed gulls are shown to be among their deadly enemies.—*G. S. S.*

Crinum podophyllum. By H. Baum (*Die Gart.* No. 2, p. 26, Oct. 8, 1905).—A native of Central Africa, where it grows at an altitude of 1,000 metres (about 8,300 feet) above sea, in shady position in humus. The pretty flowers are large, pure white. It is easily cultivated as a stove plant.—*G. R.*

Crown-gall Disease, The Wrapping of Apple Grafts, and its Relation to. By Hermann von Schrenk and George G. Hedgcock (*U.S.A. Dep. Agr. Bull.* 100, Part 2; Feb. 28, 1906).—The crown-gall disease of apple trees usually appears at or near the union of the scion and root-piece.

Protection of the graft at the union will serve to induce a better union, and may also aid in keeping out disturbing factors.

Grafts wrapped with cloth and with rubber yielded 85·1 per cent. and 86·5 per cent. of smooth trees respectively.

It is recommended that apple grafts be wrapped with cloth or rubber.—*M. C. C.*

Cucumber and Melon Diseases, Spraying for. By W. A. Orton (*U.S.A. Dep. Agr. Farm. Bull.* 281, 1905; 8 figs.).—Descriptions of the downy mildew (*Peronosporasp. cubensis* Clint.), leaf blight (*Alternaria brassica nigrescens* Pegl.), anthracnose (*Colletotrichum lagenarium* Ell. & Mart.) and of some other leaf diseases are given, as well as wilt, one form of which is attributed to *Bacillus tracheiphilus* Erw. Sm., and another form to *Neocosmospora vasinfecta*, var. *nivea*. A résumé of the results of spraying experiments is given, and for the majority of the leaf diseases spraying with Bordeaux mixture (copper sulphate 8 lbs., quicklime 6 lbs., water 50 gals.) is recommended, and the fact that there can be no danger to the consumers of the fruit from eating the exceedingly small quantity of copper which finds its way on to the fruit is insisted upon. For the powdery mildew caused by *Erysiphe Polygoni* evaporation of sulphur by placing flowers of sulphur on the water-pipes is recommended.

F. J. C.

Cycas Micholitzii. By W. T. Thiselton-Dyer. (*Gard. Chron.* No. 979, p. 142, figs. 48 & 49; Aug. 19, 1905).—This curious Cycad was discovered in Annam by Mr. W. Micholitz. A glance at the "figures will show that the striking and remarkable feature of the new species is the repeated dichotomy of the leaf pinnules." A botanical description is given in Latin.—*G. S. S.*

Cymbidium Huttoni. Anon. (*Gard. Chron.* No. 969, p. 63, figs. 21 and 22, July 22, 1905).—In this fine species, which was discovered in Java by Mr. Hutton, the flowers are about 2 inches across, of a yellowish-white colour spotted with purple. This species seems to connect *Cymbidium* and *Grammatophyllum*.—*G. S. S.*

Cypripedium guttatum. By E. Rettig (*Die Gart.* No. 1, p. 18, Oct. 1, 1905; with illustration).—This species is quite hardy and is a native of Siberia, where it grows in pine and birch forests. Most people find it one of the most difficult species to cultivate, not only to flower, but even to make grow. The illustration represents a group of flowering plants. The flowers are white, spotted with crimson or scarlet. It is one of the most distinct and showy of the genus.—*G. R.*

Dendrobium regium. By R. A. Rolfe (*Bot. Mag.* tab. 8008).—Nat. ord. *Orchidaceæ*, tribe *Epidendreae*; India. A densely tufted epiphyte, 6-12 in. high. Racemes 2-3-flowered. Flowers light purple-rose, throat a clear yellow.—*G. H.*

Derris alborubra. By W. B. Hemsley (*Bot. Mag.* tab. 8008).—Nat. ord. *Leguminosæ*, tribe *Dalbergicæ*; China. A climbing, evergreen shrub, with pinnate leaves, 6-7 in. long. Flowers, in panicles, 1 foot in length, fragrant; calyx red; corolla white.—*G. H.*

Diseases of the Apple, Cherry, Peach, Pear, and Plum, with Methods of Treatment. By E. Mead Wilcox, Ph.D. (*U.S.A. Exp. Stn. Alabama, Bull.* 132, April 1905; 9 plates).—This bulletin is a rather general one, and contains brief notices of 29 diseases of the above-named fruits, all of them well known, including apple 9, cherry 4, peach 7, pear 3, plum 6, giving the formulæ of three forms of fungicides, with instructions as to their application.—*M. C. C.*

Epiphyllum, Multiplication and Culture of. By Numa Schneider (*Rev. Hort.* April 16, 1905, pp. 190-1).—Instructions regarding grafting and culture generally, including recipes for manures.—*C. T. D.*

Erica australis. By W. B. Hemsley (*Bot. Mag.* tab. 8045).—Nat. ord. *Ericaceæ*, tribe *Ericææ*. S.W. Europe and N.W. Africa. Shrub, 6-8 ft. high. Flowers purple-red.—*G. H.*

Erica lusitanica. By W. B. Hemsley (*Bot. Mag.* tab. 8018).—Nat. ord. *Ericaceæ*, tribe *Ericææ*; Western Europe. Naturalised at Lytchett Heath, near Poole, since 1876; 1-2 acres are now covered. Height, 4-6 ft. and even to 8. An erect, densely branched shrub. Flowers white or pink.—*G. H.*

Erysiphaceæ, Further Cultural Experiments with Biologic Forms of the. By E. S. Salmon (*Ann. Bot.* xix. Jan. 1905, pp. 125-148).—In a recent paper the author described a method of culture by means of which the conidia of "biologic forms" of *Erysiphe Graminis* can be induced to infect leaves of host species which are normally immune to their attacks. In the present paper experiments are described in which

ascospores were used under the same method of culture, and in which the same infection results were obtained.

Further experiments are then recorded in which leaves were injured and thereby rendered susceptible to the attacks of conidia and ascospores which are unable to infect the leaves when uninjured. The injuries inflicted were produced by stabbing the leaf, stamping out minute portions, by pressure with weights, and by the action of heat or narcotics. It is pointed out that injuries similar to those artificially produced in the experiments must be constantly inflicted on plants in nature, by animals, frost, wind, and hail. An example is also given of barley leaves rendered susceptible by the agricultural operation of rolling seedling corn.

In order to account for the susceptibility shown by injured leaves, the assumption is made that, in consequence of the "vitality" of the leaf-cells being affected, the protection normally afforded by enzymes, or similar substances, ceases. The loss of immunity brought about by causes which affect the vitality of the leaf find their parallel in the recorded instances of induced susceptibility in animals to certain diseases caused by bacteria.

The main results obtained are summarised as follows: (1) Susceptibility can be induced not only by various kinds of mechanical injury, but also by such interference with the normal functions of the cell as follows the application of anæsthetics and heat. (2) The conidia of the first generation produced on leaves of a strange host-plant, previously subjected to action of alcohol, ether, or heat, retain the power of infecting their original host, but do not acquire the power of infecting normal leaves of their temporary host.

A detailed account of the experiments is given in the latter half of the paper.—A. D. C.

Erysiphe Graminis DC. under Cultural Conditions, On Endophytic Adaptation shown by. By E. S. Salmon (*Ann. Bot.* xix. July 1905, pp. 444-446).—The full paper on endophytic adaptations of the grass mildew (*Erysiphe Graminis*) will be found in 'Trans. Roy. Soc. B,' vol. cxviii. 1905, p. 87. An abstract only is given in *Ann. Bot.* July 1905.

The author has previously pointed out that certain species of the *Erysiphaceæ* are able, under cultural conditions, to infect their host-plants vigorously when their conidia or ascospores are sown on the cells of the internal tissues exposed by means of a wound, although the fungi in question are confined normally to the external surface of the epidermal cells.

The present paper deals with the question of the details of growth of the fungus under these abnormal conditions, and of the extent to which the hyphæ penetrate into the intercellular spaces of the internal tissues, and whether haustoria were produced by these hyphæ.

With the exception of *Phyllactinia*, the species of the *Erysiphaceæ*, so far as they have been investigated, have been found to be strictly ectoparasitic in habit, the hyphæ of the mycelium being confined to the external surface of the epidermal cells, and merely sending haustoria either into the epidermal cells alone, or, in the case of one species, into the sub-epidermal cells as well.

The fungus used in the experiments was the conidial stage of the grass mildew (*Erysiphe Graminis* DC.), a strict ectoparasite under normal circumstances. Young leaves of oats and barley were cut off from seedling plants, and a minute piece of tissue was cut out with a sharp razor from the upper surface of the leaf. In this operation the upper epidermis was removed, and often a considerable amount of the mesophyll also, so that in inoculation the conidia were sown on the sub-epidermal or deeper layers of the exposed mesophyll, or even on the internal surface of the lower epidermis. After inoculation, the leaves were placed on damp blotting-paper in a Petri dish. By the sixth to eighth day vigorous infection had nearly always resulted, the surface of the wound bearing patches of clustered conidiophores.

It was found on examining such wounded leaves that the fungus had invaded the internal tissues to a remarkable extent. Where the mesophyll-cells remaining uninjured were several layers deep, the hyphæ had penetrated inwards, winding through the intercellular spaces as far as the internal surface of the lower epidermis. Haustoria were sent into the cells of the superficial layer of the mesophyll by the hyphæ creeping on the surface of the wound, and into all the deeper layers of the mesophyll by the hyphæ running in the intercellular spaces. The cells of the lower epidermis were also attacked, the internal wall having been penetrated. The sheath-cells of the vascular bundles were much invaded by very vigorous haustoria. The haustoria formed in the cells of the internal tissues resemble in every way those which occur normally in the epidermal cells.

The hyphæ enclosed in intercellular spaces, either just below the surface of the wound or deep down in the internal tissues, struggle to produce conidiophores. The respiratory cavities over the stomata of the lower epidermis were in a great number of cases full of vigorous hyphæ producing young conidiophores. The direction of growth of the young conidiophores produced in the respiratory cavities and other intercellular spaces was usually vertical, and towards the surface of the wound.

The author, reviewing the results of the investigations, points out that they afford proof that *E. Graminis* is not, as perhaps might have been expected, so highly specialised as an ectoparasite as to be necessarily restricted for its food-supply to cells of the epidermis; but shows itself capable of immediate adaptation to conditions closely resembling those obtaining in endophytism.

This fact suggests the possibility that under some circumstances the mycelial hyphæ of species of the *Erysiphaceæ* which are normally ectoparasites may penetrate into the internal tissues of their host-plants exposed through wounds caused in nature by the attacks of animals or by physical agency. It is pointed out, however, that the successful entry of the hyphæ might be prevented, either by the drying up of the superficial layers of cells, or by the healing processes shown by many actively growing leaves.—A. D. C.

Etherisation and Chloroformisation of Plants. By J. Foussat (*Rev. Hort.* Jan. 16, 1905, pp. 45-46).—Further experiments have determined that the effects of these operations are not so transient as

was supposed, and that plants submitted to them may remain in the open for, in some cases, a month before forcing, and have then responded as readily to the stimulus. It is claimed that this fact is important to horticulturists, as larger quantities of plants can be treated at once than require immediate forcing. Chloroform requires greater care than ether in its application, and should be used much more moderately, say one-fifth as strong.—*C. T. D.*

Felicia echinata. By T. A. Spragne (*Bot. Mag.* tab. 8049).—*Nat. ord. Compositæ*, tribe *Asterioidea*. S. Africa. A small shrub, 1-2 ft. high. Leaves deflexed, $\frac{3}{4}$ in. long. Heads, $1\frac{1}{2}$ in. diam., ray flowers lilac, disk yellow.—*G. H.*

Fertilizer Experiments. By C. A. Movers (*U.S.A. Exp. Stn. Tennessee, Bull.* xvi. 1, January 1903).—The results of experiments with fertilizers suitable for Tennessee soils for sweet potatoes (which may with advantage be heavily manured), Irish potatoes, grass, clover and cowpeas are detailed.—*F. J. C.*

Fertilizers. By A. L. Knisely (*U.S.A. Exp. Stn. Oregon, Bull.* 79, 8/1904).—This bulletin gives a review of the uses of various artificial manures and a plan of an experimental plot, by the use of which the farmer or gardener may see what manures are likely to do the greatest good in raising any particular crop. This is followed by lists of manures and the quantity to be used for various crops, and by the necessary caution, "Question the soil thoroughly by means of the plans suggested before adopting the wholesale use of fertilizers. Much money is unwisely spent in buying and using commercial fertilizers." The plan of the experiment suggested is as follows :

Divide a plot of ground into six strips.

Strip A. Apply nitrate of soda at the rate of 300 lbs. per acre.

Strip B. Acid phosphate, 600 lbs. per acre.

Strip C. Muriate of potash, 300 lbs. per acre.

Strip D. No manure.

Strip E. Nitrate of soda, 300 lbs. per acre.

Acid phosphate, 600 lbs. per acre.

Muriate of potash, 300 lbs. per acre.

Strip F. Farmyard manure, 10 tons per acre.

F. J. C.

Field Crops, Root Systems of. By J. H. Shepperd (*U.S.A. Exp. Stn. North Dakota, Bull.* 64 ; plates).—An illustrated account of examinations into the root systems of various crops, including wheat, Indian corn, and barley. The plants selected were dug round until each was left standing in its own square pillar of earth ; this pillar was then tightly incased in wire-netting stretched on a wooden framework ; plaster of Paris was then poured into the top of the crate thus made, which hardened and kept the plant firmly in position. Water was afterwards sprayed through the wire until the earth was washed away and the roots left clean and bare.—*M. L. H.*

Figs, The Cultivation of. By O. T. (*Gard. Chron.* No. 980, p. 257, fig. 96; Oct. 7, 1905).—This subject is fully discussed in the present article, which is divided into the following sections: Principles of culture, Top-dressing, Soil and water, Summer culture, Seeding time, Varieties.

G. S. S.

Flood-damaged Land, Treatment of (*U.S.A. Exp. Stn. Kansas, Bull.* 121, 1/1904; 16 figs.).—Enormous damage was done by floods during May and June 1903 in Kansas. Crops were destroyed, much soil was washed away and great holes gouged out, and sand was deposited over fertile lands to the depth of from a few inches to several feet, while other parts were covered with mud. The bulletin contains recommendations for the utilisation of these lands and their gradual reclamation. It is recommended that the "mudded" and drowned lands should be laid down to grass, while the sanded area should be sown with grasses like *Ammophila arenaria* (L.) Link, *Poa compressa* L. &c.; these will tend to form humus and gradually bring the land into better form. Certain trees may also be planted on the sanded area, such as *Catalpa speciosa*, *Robinia pseudacacia*, *Ioxylon pomiferum*, *Morus alba*, *Populus deltoides* and *P. monilifera*, the last two particularly where the sand is deep.

F. J. C.

Forsythia europæa. By W. B. Hemsley (*Bot. Mag.* tab. 8089).—Nat. ord. *Oleaceæ*, tribe *Syringææ*. Albania. An erect glabrous shrub, a few feet high. Flowers yellow, appearing before the leaves, 1½ in. across.

G. H.

Fraser's Catalogue, 1796 (*Journ. Bot.* 515, pp. 329-381; 11/1905).—A verbatim-et-literatim reprint of the catalogue of plants and seeds offered by John Fraser, of Sloane Square, Chelsea, on his return from his fifth voyage to America.—G. S. B.

Fruit Crops, Report of. Anon. (*Gard. Chron.* No. 970, pp. 81-87, July 29, 1905).—This is the report which is given every year in this paper "On the Condition of the Outdoor Fruit Crops," in various parts of the United Kingdom. No less than 270 observers, whose names and addresses are given, have reported on the crops in their neighbourhood. The report is a very unfavourable one. In only one locality in England (Hounslow) and in two in Scotland (Laurencekirk and Ayr) was the apple crop above the average; of the others about 15 per cent. were an average crop, and 85 per cent. under the average. The pear crop was slightly better than the apple, but it was very bad. The crop of small fruit was not so bad, and in some places it was over the average, but on the whole it was poor. In the remarks which precede the tabulated returns the writer says: "As to the causes which have induced this poor show of fruit, we do not think that we have any need to inquire further. Spring frosts and east winds occurring at or about the flowering period are responsible for most of the mischief. As these occur pretty regularly, it would seem as if our hybridisers and cross-breeders had been lacking in enterprise, or they would have long ago given us later-flowering or more hardy varieties." The full reports from the various counties are given in subsequent numbers.—G. S. S.

Fruit Industry at Barbados. By J. R. Bovell, F.L.S. (*W. Ind. Bull.* vol. vi. No. 2, 1905).—The fruit which is exported in the largest quantities is the banana, of which details and statistics are given. Following are mangoes, avocado pears, citrus fruit, and golden apple. The best mangoes were reported as sold in London at 1s. 6d. each. In some instances the consignments arrived in splendid condition; in others the whole consignment had rotted. It is hoped that a better knowledge of the right temperature at which to carry them may render their shipment remunerative.—*M. C. C.*

Fruits, Promising New. By W. A. Taylor (*U.S.A. Dep. Agr. Year Book*, 1904, p. 399; plates).—This long and valuable article commences by pointing out the importance of fruit-growers keeping in touch with the advances made in cultivation and in raising new varieties. Among the new kinds of fruits described and illustrated are the 'Blcomfield' apple, handsome in appearance, excellent in quality, and an abundant annual bearer; the 'Rossney' pear, rich and juicy, good quality and appearance; the 'Perfection' currant, which was raised from seed of the 'Fay,' the blossoms of which were crossed with 'White Grape,' bearing clusters of fruit, bright crimson in colour, tender and juicy, good quality both for dessert and cooking. The 'Delmas Persimmon' and various pecans are also carefully described.—*V. J. M.*

Fruit Trees Frozen in 1904. By M. B. Waite (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 51; plates).—From observations made after a very destructive frost, growers are advised not to be in too great a hurry to cut down either peach or pear trees until they have made sure that they are frozen past recovery. If the bark is entirely blackened and dead and separated from the trunk, if the wood has turned a very dark brown colour, and if the injury extends up the limbs, the trees are dead beyond all question; but if the bark is still adhering or is only partially separated from the wood, the chances of recovery are good. The hardest portions of a peach tree are the cambium layer, a thin film of vital tissue between the bark and the wood, and the leaf-buds. If the former of these is uninjured it will carry the elaborated sap downwards from the leaves, the dead wood, if it remains moist, being able to conduct the crude sap upwards, and so, in time, increasing layers of new wood are formed, and the tree is preserved for several years of profitable life. Good cultivation and fertilisation, and only very moderate pruning, are recommended to enable the tree to grow out of the injury. Nursery trees and quite old trees proved the most liable to fatal injury; but even these were sometimes uninjured below the snow-line, and, if low-headed trees were not objected to, could be cut down and started again from this point.

Plums and pears showed injuries of the same nature as those of the peach trees, but pears proved the most unlikely of the three to recover.

M. L. H.

Fruit Trees, On the Forms of. By A. Ville (*Bull. R. Soc. Tosc. Ort.* 3, p. 73, March 1905).—The shaping of trees must be guided by their natural habit, e.g. the pyramidal form cannot be adopted for varieties of

pears of diffuse branching habit, such as Épargne, Curé, Beurré d'Amanlis, B. magnifique, &c. ; in such cases the espalier would be better. It should also be abandoned in the case of all varieties producing large fruits. It is impossible to obtain perfect shapes in those varieties which, after being planted, produce only two or three shoots at the top. Again, as the pyramid-shape is a bulky one, it cannot be adopted for trees planted in small gardens. Also the form of the tree to be adopted depends very largely on the kind of soil in which the tree is grown ; different soils will give different results. The climate is another factor for consideration : in damp and badly ventilated places, old and delicate varieties like Beurré d'Hardenpont, Royale d'hiver and Bon Chrétien d'hiver have a tendency to rot ; from such situations thick, bushy forms should be excluded. The economical question is one of great importance, especially in connection with the space available for growing larger or smaller forms of tree.

The spindle-form is one which has the advantage of fruiting more rapidly than the pyramidal ; for this purpose varieties must be chosen which tend to form their branches in the direction of the axis of the stem. Such are : Nec plus Meuris, Beurré d'Hardenpont, La France, Doyenné du Comice, Charles Cognée, Passe Crassane, &c.

As a rule apples are the best adapted to the spindle-shape, because they tend to grow straight and robust, bear well-fastened fruit, and their grafts are firm and sound.

More than 200 years ago fruit-growers adopted the espalier, of which the fan-shaped type seems to have been the first. The various varieties are adapted to different conditions and positions.

The author maintains that oblique cordons are always to be preferred if one desires to obtain the finest apples and pears, and one can obtain just what one likes from them ; if the growth is seen to be luxuriant the branches are trained horizontally, if the opposite is the case they are trained vertically. The peach is cited as the tree which gives the best results under the espalier form, especially as it is sensitive to cold nights. But it may also be grown with good results as an isolated tree under the form of a low spindle. In conclusion it is stated that the simplest form of tree should be adopted in the case of the production of valuable fruit.

W. C. W.

Fungi, Recent Researches on the Parasitism of. By H. Marshall Ward (*Ann. Bot.* xix. Jan. 1905, pp. 1-50).—A general historical survey is first given of the progress of mycology during the past century, after which the author limits himself to the discussion of recent researches on the Uredineæ.

The salient features of modern work are considered under the following headings : germination of uredospores, specialised parasitism, immunity, susceptibility, mycoplasma and infection.

Some new points of interest are brought forward in connection with the author's most recent work on *Puccinia glumarum*. He finds that in "immune" forms of wheat the uredospores germinate and send out tubes into the stomata in the usual way, but the hyphæ soon exhibit a starved appearance, and undergo death-changes about the sixth day. The conclusion arrived at is : the fungus attacks the host-cells with such

vigour that it kills them almost immediately, and itself thus becomes a victim to starvation.

The writer maintains his position as to the mycoplasma theory and states that pure cultures give no evidence that lends support to that hypothesis; he further believes that the entering germ tube and sub-stomatal vesicle would be discovered if serial sections were cut through the patches at the margin of which "protomycelium" and "mycoplasma" are found. He believes the mycoplasma theory has arisen through reading the phenomena backwards. (See also abstract under *Uredineæ*.)

As to bridging species, the author states that he is convinced that it is here we have a clue to the phenomenon of the ever-widening cycle of adaptation. In 999 times out of 1,000 the spores adapted to a small given circle of host-plants cannot successfully break through the defences of another circle. But in the 1,000th case a spore may infect an alien host, and once established its progeny can go on infecting that new host. The evidence compels us to believe that the host reacts upon and affects the physiological powers of the fungus; the effects are invisible and produce no distinguishable morphological impression on the spores. But if very slight morphological results should follow, we have then the clue to the graduation of morphological differences, sufficiently distinct for the determination of species.—*A. D. C.*

Fungous Diseases, Farmers' Bulletins (*U.S.A. Dep. Agr.* 219, 221, 231, 243, 250).—The following are part of a series of bulletins issued by the United States Department for the use of farmers and cultivators.

219. Lessons from the Grain Rust Epidemic of 1904, by Mark Alfred Carleton, with six woodcuts.

221. Fungous Diseases of the Cranberry, by G. L. Shear, with eleven woodcuts.

231. Spraying for Cucumber and Melon Diseases, by W. A. Orton, with eight woodcuts.

243. Fungicides, and their Use in Preventing Diseases of Fruits, by M. B. Waite, with seventeen woodcuts.

250. The Prevention of Stinking Smut of Wheat, and Loose Smut of Oats, by Walter T. Swingle, with seven woodcuts.

These bulletins are simply popular expositions for the use of those interested in the cultivation of the various plants, and are not expected to contain any new facts or experiments, or novel information calling for special notice. They may be suggestive to the Agricultural Departments of other Governments as to the methods which may be employed for the diffusion of useful knowledge where it is often much needed.—*M. C. C.*

Fungous Diseases, Report for 1904. By G. P. Clinton, Sc.D. (*U.S.A. Exp. Stn. Connecticut*; with 97 plates).—This report deals with about thirty-three separate diseases on various plants, including Asparagus Rust, Smutty Mould of Fig, Bacterial Disease of Mulberry, Stem Rot of Onion, Rhizoctonia or Rosette of Potato, Root Rot of Radishes, and Stem Rot of Rhubarb; followed by a Report on Downy Mildew or Blight of Musk Melons and Cucumbers (*Peronoplasmodium*

cubensis), with a concise account of its distribution, systematic position, life-history, and modes of prevention.

This is succeeded by an account of the Downy Mildew or Blight of Potatoes (*Phytophthora infestans*), giving the life-history of the fungus, results of spraying experiments during three years, and general conclusions. Early potatoes suffer very much less from blight than the late varieties. There is no doubt that the character of the season is the dominant factor in determining how little or much damage will be caused by blight. Wet weather in August or September following the blighting of the vines determines largely the amount of rot that develops in the tubers. The first step in lessening the disease should be the selection of seed as free as possible from disease. The results of spraying with Bordeaux mixture vary with different seasons, but depend largely on the thoroughness of the treatment, and its application at the proper time.—*M. C. C.*

Gentiana Melvillei. By S. Moore (*Journ. Bot.* 509, pp. 148-144; 5/1905).—Description of a new, apparently annual, species, probably with pale mauve flowers, near *G. filicaulis*, collected by Major Melville, at 8,000 feet altitude, at Pyinsamben, in the Shan States, and preserved in the National Herbarium.—*G. S. B.*

Gipsy Moth, The. By J. K. M. L. Farquhar (*U.S.A. Hort. Soc. Mass. Trans.* 1904, pp. 19-24).—The gipsy moth was introduced to America about 1868 for experiments in silk raising and allowed to escape. It rapidly increased, and now attacks large numbers of shade, fruit, and forest trees, often completely defoliating them. In addition to this the leaves of many herbaceous plants are eaten voraciously. The writer warns all to do what is in their power to exterminate the pest, and suggests that investigators should be sent to Europe to discover the natural enemies of the moth.—*F. J. C.*

Gladiolus, The. By A. Cowee (*U.S.A. Hort. Soc. Mass. Trans.* 1904, pp. 124-132).—This paper deals chiefly with Groff's Hybrid Gladioli. The manner in which they are raised and cultivated is treated of, and claims are made as to their superiority over all other forms of *Gladiolus* for garden purposes.—*F. J. C.*

Gnidia polystachya. By M. S. Brown (*Bot. Mag.* tab. 8001).—Nat. ord. *Thymelæaceæ*, tribe *Euthymelææ*; South Africa. A free-growing, densely branched shrub, 5-6 ft. high. Flowers in dense clusters, yellow, and heterostyled as to style and calyx-tube, but not the stamens.—*G. H.*

Golden Seal (*Hydrastis canadensis* Linn.). By Alice Henkel and G. F. Klugh (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 51, 2/1905; 4 figs., 2 plates).—This plant, official in U.S.A., is becoming scarce, and the price has increased from about 20 cents per lb. in 1894 to \$1.25 in 1904. About 200,000 to 300,000 lb. are grown yearly. The rhizome and young roots are used in the drug trade. It is of a yellow colour, changing after some time to a greenish yellow or brown internally, and deteriorating in quality. The value of the root lies in the alkaloids which it contains,

hydrastin, berberin, and canadine. The cultivation required is similar to that of ginseng, and the plants are propagated by seed, by division of the rhizome, or by root division. The crop matures in about three years, and the yield should be over 1,500 lb. per acre of dried roots. It is necessary to grow the plant in the shade, since it is at home in the woods of the Eastern States from New York and Ontario southwards.—*F. J. C.*

Grain Smuts, how they are caused, and how to prevent them. By Walter T. Swingle (*U.S.A. Dep. Agr. Farmers' Bull.* 75, 1898; 7 cuts).—A popular description of the smuts which affect grain, with suggestions how to control them; prepared, and circulated among farmers, with practical instructions.—*M. C. C.*

***Helichrysum Davyi* and *H. Saweri*.** By S. Moore (*Journ. Bot.* 510, pp. 169-171; 6/1905).—Descriptions of new South African species, collected respectively by J. Burt Davy in the Transvaal and by E. R. Sawyer in South Rhodesia.—*G. S. B.*

***Hippophaë rhamnoides*.** By W. B. Hemsley (*Bot. May.* tab. 8016).—Nat. ord. *Elæagnaceæ*. Temperate Europe and Asia. Shrub or small tree, shoots and leaves covered with peltate silvery scales. Flowers very small, dioecious perianth of ♀ flower tubular, enclosing the ovary and becoming fleshy in fruit, orange-coloured.—*G. H.*

***Hormium pyrenaicum* var. *grandiflorum rubrum*.**—By F. Rehnelt (*Die Gart.* No. 22, p. 262, Feb. 22, 1906).—A pretty alpine plant with large, bright purple flowers. An acquisition for the rocky border.—*G. R.*

Horticultural Society of Massachusetts, Trans. of, 1904 (pp. 202; 14 plates and 9 figs.).—Contains the President's Address and numerous interesting and useful papers, as follows: "The Gipsy Moth and its Ravages," "Trees, Flowers, and Fruits of the East," "Nature Study in Public Schools," "The Arnold Arboretum," "Observations in Horticulture," "Orchids and their Culture," "Study of Parasitic Fungi," "Protection of Native Plants," "The Gladiolus," "Pæony and Pæony Culture," "John Richardson: His House and Garden."

F. J. C.

Hybridising Hollies. By F. W. Card (*U.S.A. Exp. Stn. Rhode I. Rept.* 1908; p. 228).—Endeavours were made to cross *Ilex glabra* (a black-berried evergreen) with *I. verticillata* (a bright red-berried deciduous species), but in all cases unsuccessfully though the conditions were favourable. The flowers of *I. verticillata* crossed with *I. glabra* were, however, accidentally destroyed before the results were seen. It was hoped to secure a red-berried evergreen. Further trials are in progress.—*F. J. C.*

***Hysanthes Plantaginella*.** By S. Moore (*Journ. Bot.* 506, p. 49; 2/1905).—Description of a new species, a very distinct and pretty little plant with scarlet flowers, found by Mr. Eyles in streams running over granite in the Matopopo Hills.—*G. S. B.*

Impatiens Holstii. By W. B. Hemsley (*Bot. Mag.* tab. 8029).—Nat. ord. *Geraniaceae*, tribe *Balsamineae*; E. Tropical Africa. Flowers pure scarlet, $1\frac{1}{2}$ in. across.—*G. H.*

Indigo-producing Substance in Indigo Plants, The Localisation of the. By H. M. Leake (*Ann. Bot.* xix. April 1905, pp. 297–309; one plate).—The author made a microscopic examination of the tissues of several indigo-containing plants. He employed a sulphuric-acetic-persulphate solution which precipitates the indigo in the cells of the tissue as blue granules, and which at the same time acted as a fixing agent. The material was then cut and stained in the usual way.

Indigofera.—Various species were examined. In *I. sumatrana* and *I. arrecta* indigo was precipitated freely. The leaf showed it to be present in all tissues except the xylem vessels, not even excluding the epidermis and guard-cells. In the rachis it is present in the pith, cortex, and phloem, and absent only in the xylem vessels and the lactiferous system. The stem shows indigo only near the growing point; here it is deposited in all elements except the xylem vessels and lactiferous cells. A small quantity is present in the flowers. The roots show no indication of indigo.

Isatis tinctoria.—The main deposit in this plant occurs in the mesophyll and veins of the lamina. In the epidermis precipitation also occurs, especially in the guard-cells. The stem and flowers show no blue coloration.

Polygonum tinctorium.—The results of Molisch are confirmed, the dye only occurring in the lamina of the young leaves.

Phajus grandifolius, *P. Wallichii*, *P. maculatus*, as well as *Calanthe vestita* and *C. Veitchii*, show abundant deposit in the parenchyma of the mesophyll, xylem parenchyma, and guard-cells; less is deposited in other parts of the leaf, and none in the xylem vessels. Indigo is found throughout the tissues of the pseudo-bulbs except the xylem vessels and raphide cells.

Strobilanthes flaccidifolius.—In the stem and leaf a deposit of indigo is found in all the tissues except the xylem vessels.

The author concludes by stating that it is impossible to accredit to the chloroplasts any direct function in the production of the indigo-forming substance.—*A. D. C.*

Insect Injuries to Indian Corn. By S. A. Forbes (*U.S.A. Exp. Stn. Illinois, Bull.* 95, Nov. 1904; 5 plates (coloured) and 38 figs.).—The bulletin opens with a general discussion of the injury caused by insects to the corn, in the course of which it is pointed out that “many insects will not thrive as well or multiply as rapidly on a vigorous, quickly growing plant as on one in feeble condition.” It is therefore important that the cultivation should be of the best. In addition to this, proper rotation of crops, timely ploughing and planting, the use of barriers against the movement of destructive species from adjacent fields, combined with insecticide measures, are the general points to be kept in view in dealing with these injurious insects. The following insects are dealt with in detail, others of less importance being mentioned in passing:—The

Glassy Cutworm (*Hadena devastatrix* Brace), Yellow-headed Cutworm (*H. arctica* Boisd.), Greasy Cutworm (*Agrotis ypsilon* Rott.), Variegated Cutworm (*A. saucia* Hübn.), Spotted Cutworm (*Noctua c-nigrum* Linn.), Dingy Cutworm (*Feltia subgothica* Haw.), Striped Cutworm (*F. jaculifera* Guen.), Clay-backed Cutworm (*F. gladiaria* Morr.), Bronze Cutworm (*Nephelodes minians* Guen.), W-marked Cutworm (*Noctua clandestina* Harr.), Granulated Cutworm (*Feltia annexa* Tr.), Dark-sided Cutworm (*Euxoa messoria* Harr.), Common Striped Cutworm (*E. tessellata* Harr.), Red-backed Cutworm (*E. ochrogaster* Guen.), Bristly Cutworm (*Mamestra renigera* Steph.); several Root Web-worms which hide away in silken burrows during the day and feed on the plants when quite young at night, often causing widespread injury (*Crambus mutabilis* Clem., *C. trisectus* Walk., *C. luteolellus* Clem., and *C. vulgivagellus* Clem.); of less importance are the burrowing Web-worms *Anaphora popeanella* Clem., *Pseudanaphora arcanella* Clem., *Hypoclopus mortipennellus* Grote. The Stalk-borer (*Papaipema nitela* Guen.), the Corn-worm (*Heliothis armiger* Hübn.), and the Army-worm (*Leucania unipuncta* Haw.), complete the list of the *Lepidoptera* doing injury to corn. Among *Coleoptera* the following Corn Bill-bugs are troublesome: *Sphenophorus parvulus* Gyll., *S. venatus* Say, *S. ochreus* Lec., *S. pertinax* Oliv., *S. cariosus* Oliv., *S. scoparius* Horn., *S. sculptilis* Uhl., and *S. robustus* Horn. Of other insects the Chinch Bug (*Blissus leucopterus* Say) and various Grass-hoppers are fully described. Some others, like the wire-worm and May-bug, have been dealt with in earlier bulletins. In each case suitable means for lessening the danger of attack are mentioned.—F. J. C.

Insecticides and their Use. By J. B. Smith (*U.S.A. Exp. Stn. New Jersey, Bull.* 169).—Recipes and directions for use of various insecticides, all of which have recently been referred to in these abstracts.

• F. J. C.

Insecticide Use of Gasoline Blast Lamp. By S. A. Forbes (*U.S.A. Exp. Stn. Illinois, Bull.* No. 89, 11/1908).—The ordinary plumber's torch is probably the most dangerous to vegetation of any insecticide apparatus which has ever been brought forward for common use. The margin of safety must be in most cases very narrow. It might, however, be usefully employed in the destruction of those insects that can be lured on to a valueless crop away from a valuable one, and might perhaps be tried for the destruction of chinch bugs as they come out of small grain for their midsummer invasion.—F. J. C.

Insects, Destructive, in the United States. By C. L. Marlatt (*U.S.A. Dep. Agr. Year Book*, 1904, p. 461).—It is asserted that in no country in the world do insects impose a heavier tax on farm products than in the United States. The losses resulting from the depredations of insects on plant products exceed the entire expenditure of the National Government. It is, however, stated confidently that the losses would be much heavier but for the various methods of control, and attention is drawn to these methods. The prevention of loss from the Hessian fly, due to the knowledge of proper seasons for planting and other direct and cultural methods, results in an enormous saving annually. Careful

statistics show that two-thirds of the damage caused by the codling moth can be prevented by the adoption of arsenical sprays, banding, and other methods of control. An interesting fact is stated, viz. that the introduction from Australia of a natural enemy of the white scale, an insect pest which destroyed orange and lemon orchards, has saved millions of money every year.—V. J. M.

Insects Injurious to Shade Trees, &c. By J. B. Smith (*U.S.A. Exp. Stn. New Jersey, Bull.* 181, 8, 1905; 24 figs.).—The author points out the disadvantages under which trees in towns suffer, and the probability of insect pests causing more damage to these than to trees growing under more suitable conditions. The various insects attacking the trees usually planted are then separately dealt with. Aphis, leaf-hoppers, scale insects (the cottony Maple Scale, *Pulvinaria innumerabilis* Rathy; the Tulip Scale, *Lecanium tulipifera* Cook; the Mussel Scale, *Mytilaspis pomorum* Bouché; the Scurvy Scale, *Chionpasis furfurus* Fitch; the Rose Scale, *Diaspis rosa* Bouché; the San José Scale, *Aspidiotus perniciosus* Comst., and *Pseudococcus aceris* Geoff.), the bark borers, the Wood Leopard (*Zeuzera pyrina* Linn.), and the Maple Clearwing (*Sesia acerni* Clem.), and the following that attack the leaves, the White-marked Tussock Moth (*Orgyia leucostigma* S. & A.), the Bag Worm (*Thyridopteryx ephemeraformis* Harr.), the Fall Web-worm (*Hyphantria cunea* Drury), the Elm-leaf Beetle (*Galerucella luteola* Müll.), and saw-fly larvæ (slug-worms) are all described and figured, and appropriate methods of dealing with them are suggested. The most useful insecticides are Paris green and arsenate of lead for poison sprays against leaf-eating insects, and for contact poisons, fish-oil soap. Formula:—

Caustic Soda (75 per cent.)	6 lb.
Water	1½ gallons.
Fish oil	22 lb.

This makes about 40 lbs. of soap, and it may be used at the rate of 1 lb. of soap to seven gallons of water.

The trees that suffer least from insect and fungal attacks in New Jersey are the Tree of Heaven (*Ailanthus glandulosus*), the Maidenhair Tree (*Ginkgo biloba*), and the Sweet Gum (*Liquidambar styraciflua*), while the Black Locust (*Robinia pseudacacia*), and the Honey Locust (*Gleditschia triacanthos*) are most subject to insect attacks.—F. J. C.

Iris tectorum, Maxim. By C. D'Ancona (*Bull. R. Soc. Tosc. Ort.* 5, p. 188; May 1905).—In the latter part of April and beginning of May 1905, the author saw this plant in flower in the Experimental Garden of the R. Società Toscana di Orticoltura; it is one of the best and most worthy of notice by gardeners and lovers of flowers. It has not been widely appreciated and diffused, although it was first described by Maximowics (*Diagn. brev. Pl. nov. Japan.*, decas viii. p. 558), and later by Miquel under the name of *I. cristata* (*Prol.* p. 805); and again it was described, and well figured by chromolithography, by Regel in 1872 (*Gartenflora*, vol. xxi. p. 65, plate 716). It is not mentioned by the

accurate Guichéneuf (*Les Plantes bulbeuses, tuberculeuses et rhizomateuses ornementales de serre et de pleine terre*), and it does not figure in the catalogues of the best-known horticulturists of Europe, except the Catalogue No. 129, 1892, of Dammann & Co., of S. Giovanni at Teduccio, near Naples; the *Irid List of Plants offered by the Hortus botanicus Vomerensis*, C. Sprenger, Naples-Vomero, July 1904; and the Catalogue général of Vilmorin-Andrieux et Cie., Paris, 1905, p. 172. C. Sprenger received seeds of the var. *candida* from Central China, and calls it a true gem and a precious acquisition for our gardens. The type comes from China, and also from Japan; it is commonest in the environs of Yokohama, and owes its name to the fact of its growing on the straw-and-clay-roofed peasants' huts, to which it imparts a most beautiful appearance during the time of its flowering. The chief characters distinguishing it from its allies are: the tuberous articulated rhizome; the leaves strongly carinate on dorsal side, linear-lanceolate, long-acuminate; scape simple, bearing two or three flowers; peduncle as long as ovary; flowers of a deep azure-blue, with the three outer perianth-segments reflexed, expanded, with undulate limb, adorned with stripes interrupted by a deeper colour, which in the whitish claw become violet and narrower; the three inner divisions are erect and recurved towards centre of flowers; of a rather paler colour, and without spots and stripes.

The form and colour of the flower are of the greatest beauty. It will grow in pots or in open ground, in shade or in sunshine; but not in a too damp soil. It requires neither manure nor water in summer, and complete rest in winter. It should be planted in October or November; and it flowers in April or May. It can withstand several degrees of frost, and is much hardier than *I. fimbriata*.—W. C. W.

Irrigation Waters and their Effects. By W. P. Headden (*U.S.A. Exp. Stn. Colorado, Bull.* 88; 10/1908).—Gives a popular account of the changes that take place in stored water and during the passage of the irrigation water through the soil. It is pointed out that the exhaustion of the fertility of the Colorado soils proceeds very slowly, particularly with regard to potash and phosphoric acid. It is also shown that the amount of matter carried by the irrigation water is so small (0.0016 per cent.) as to have no appreciable manurial value.—F. J. C.

Jacobinia, On a brilliant Pigment appearing after Injury in Species of. By T. Parkin (*Ann. Bot.* xix. Jan. 1905, pp. 187-8).—*J. tinctoria* and *J. Mohintli* were investigated. The pigment does not exist as such in the living plant, but only appears on death. Leaves, however, killed with boiling water remain green and do not darken. Hence it is most likely that the pigment arises through enzymic action. Oxygen is necessary for its formation. It is readily soluble in water, and gives a fluorescent solution; purple to violet by transmitted, and blood-red by reflected light. Acid robs the solution of its colour, but alkali turns it bluer. Other chemical details are given.—A. D. C.

Kimberley, Horticulture at. By A. Chandler (*Gard. Chron.* No. 945, p. 67, figs. 80 and 81, Feb. 4, 1905).—In this paper an interesting

account is given of the conditions in which horticulture is carried on at Kimberley, S. Africa, and of the huge pergola-like structure, a mile in length, covered with grape-vines, which bear on an average 40 tons of grapes per annum.—*G. S. S.*

Lachenalia Hybrids. By F. W. Moore (*Gard. Chron.* No. 954, p. 210, figs. 91, 92, and 93, Apl. 8, 1905).—An interesting account of the history of these plants is given in this paper, and of the author's efforts in their production.—*G. S. S.*

Lachenalia lilliflora. Anon. (*Gard. Chron.* No. 980, p. 259, fig. 97; Oct. 7, 1905).—This pretty white lachenalia was described many years ago by Jacquin, but it has not been known to flower in England until this year, when it blossomed with Mr. Jas. O'Brien at Harrow-on-the-Hill. It differs considerably in the form of the flowers from the other cultivated species, which have much more tubular flowers. It is a native of S. Africa, and blossoms freely in a cold greenhouse.—*G. S. S.*

Lathræa squamaria. By O. Jacobs (*Die Gart.* No. 32, p. 378, May 6, 1905).—A very interesting as well as pretty parasitic species, closely allied to the genus *Orobanchæ*. It will thrive in a moist position near alder trees or hazel-nut bushes. The racemose flowers are flesh-coloured or pink.—*G. R.*

Laurel, The. By C. Sprenger (*Bull. R. Soc. Tosc. Ort.* 1, p. 26, Jan. 1905).—In habit it is not a tree, but can be made one by suppressing all the suckers springing up at its base. Its berries are used for veterinary purposes. The dried leaves are used in cooking and for packing fruit. They are sent in fresh condition from Italy to Germany, where they are used for religious and artistic ornaments. The plant ought to be more widely used for beautifying landscape, for drying up damp spots, and for adorning the banks of rivers, brooks, and ponds. The Greeks and Romans possessed great advantages in the utilisation of the laurel in this way.

It is cultivated in pots or tubs of various sizes, especially in Holland and Belgium, but also in France and Germany, where it is seen in theatres, restaurants, cafés, as villa ornaments, and flanking the roadways.

It is grown either as a tall, tapering shrub, or in regular pyramidal form, and for the decoration of verandahs, terraces and stairways nothing is more excellently adapted or more attractive to the eye. It is found in every good garden at Ghent, Brussels, Bruges, and many other towns. The writer has seen proprietors of big establishments and famous growers making a hobby and pastime of the training up of this plant.

The laurel is raised preferably from seed, as in that way it has less tendency to form suckers, although these latter are used for obtaining varieties with very large leaves; and further, the plants are not constant from seed. They are annually transferred from pot to pot as they grow older, until finally they are ready for sale in tubs. The bare stem has a length of 1-2 metres (3 feet 8 inches to 6 feet 6 inches), ending in a very dense crown, perfect in shape and of a dark green colour. The pyramid-

forms have no bare length of stem, but the foliage sweeps the ground. The height of the trees is about 8 metres (10 ft.). They flourish wonderfully in soil made from oak- and orange-leaves. They vary in price, according to age, beauty, and size, from 100 to 200 lire (£4 to £8) the pair.—*W. C. W.*

Lawns, Manuring of. By A. D. H. (*Gard. Chron.* No. 942, p. 17, Jan. 14, 1905).—The question how to improve the grass of lawns, tennis-courts, &c. is one of increasing interest, particularly as near London the difficulty of obtaining good turf is so great. The judicious manuring of lawns appears from experiments which have been carried out at Rothamsted, and of which a short account is given in this paper, to be very successful in destroying weeds, or rather in enabling the grass to smother the weeds. Details as to the best manures and the proper amounts to use are given.—*G. S. S.*

Leptosporangiate Ferns, On the Arrangement of the Vascular Strands in the 'Seedlings' of certain. By S. E. Chandler (*Ann. Bot.* vol. xix. July 1905, pp. 365–409; 3 plates).—Seventeen species of ferns were investigated. The following conclusions are reached: The primitive type of vascular system in the ferns is a solid rod of vascular tissue, which may be a solid xylem strand surrounded by phloem, or an amphiphloic strand. The complex dictyostelic structure results from the moulding and elaboration of this solid vascular strand, the moulding and elaboration being largely due to the necessity for an efficient attachment of leaf-traces. The development of the vascular system proceeds along certain well-defined lines, and practically all the intermediate stages have been adopted by different plants as most suited to their individual mature requirements. The ontogeny of the vascular system strikingly resembles what we must suppose to have been its phylogeny.—*A. D. C.*

Lettsomia Melvillei. By S. Moore (*Journ. Bot.* 509, p. 144; 5/1905).—Description of a new species resembling *L. setosa*, but possibly an *Ipomœa*, collected by Major Melville, at 3,000 feet altitude at Pyinsamben, in the Shan States, and preserved in the National Herbarium.—*G. S. B.*

Leucadendron argenteum. By C. Sprenger (*Bull. R. Soc. Tosc. Ort.* 4, p. 120; April 1905).—The silver-tree grows well and handsomely in the gardens of Naples and Palermo, where it is quite at home. It likes the open air and light soil; it cannot bear to be shut up in a plant-house, and can resist fairly low temperatures outside. Its roots do not like to be confined to pots. It will grow in open woods and copses, and looks well planted in small groups; it likes rocky, but at the same time deep and sweet soil. It prefers hillsides and to grow among rocks, artificial or otherwise. This tree is also called by the colonists of the Cape "The Splendour of our Woods." It grows much better in woods than under the restraining and conventional conditions of gardens; it is indeed the tree of liberty. The tree is not only beautiful, but useful; for the bark contains tannin. The white wood is used, even in Europe, for numerous kinds of artistic ornaments.—*W. C. W.*

L'Héritier, Bibliography of. By J. Britten and B. B. Woodward (*Journ. Bot.* 518, pp. 266-273, and 515, pp. 325-329; 9/1905 and 11/1905).—A careful investigation of the real date of issue of the fasciuli, plates, &c., of the "*Stirpes Novæ*" (1785-1789) and of L'Héritier's other works, with considerable biographical detail.

G. S. B.

Lime-Sulphur-Soda Wash for Orchard Treatment (*U.S.A. Exp. Stn. New York, Bull.* 247; 4 plates).—The wash was of the following composition :

Lime	30 lb.
Sulphur	15 lb.
Caustic soda	4-6 lb.
Water	50 galls.

The lime was slaked with 6 galls. of water; while it was slaking, the sulphur, which had been made into a thin paste with hot water, was added and thoroughly mixed in. The caustic soda was then added, and water as needed, the whole being kept stirred the while. As soon as chemical action had ceased the required amount of water was added, and the mixture was ready for use.

The results of treatment for scale insects were somewhat variable, but often good, while the wash proved very efficient in preventing injury by early spring leaf-eating caterpillars such as the bud moth (*Tmetocera*) and species of case-bearers (*Coleophora*).

For codling moth the Bordeaux-arsenical wash was the more effective. This was compounded of

Copper-sulphate	5 lb.
Quicklime	3½-5 lb.
Water	50 galls.
Paris green	½ lb.

and was applied (1) as the leaf-buds commenced to appear green at the tips; (2) just after the blossom fell; and (3) from ten to fourteen days after the second treatment.—F. J. C.

Limonium, Notes on. By C. E. Salmon (*Journ. Bot.* 505, pp. 5-14, 1/1905; and 506, pp. 54-59, 2/1905).—A continuation of previous papers dealing with this genus, familiar to many as *Statice*. These instalments treat respectively of *L. vulgare* (*Statice Limonium* L.) and *L. humile* (*S. rariflora* or *bahusiensis*) and their varieties, synonymy, characters, general distribution, and distribution in Great Britain.—G. S. B.

Lindelofia spectabilis var. afghanica. By O. Jacobs (*Die Gart.* No. 8, p. 90, Nov. 18, 1905).—A hardy perennial, growing about 2 feet in height, with showy, urceolate flowers of a deep blue colour.—G. R.

Lindenbergia Melvillei. By S. Moore (*Journ. Bot.* 509, pp. 144-145; 5/1905).—Description of a new species, formerly, but erroneously, referred to *L. philippinensis*, collected at a height of 8,000 feet at Hopong, in the Shan States, and by Dr. Henry at Hupeh, in China.—G. S. B.

Lissochilus Eylesii. By A. B. Rendle (*Journ. Bot.* 506, p. 53; 2/1905).—Description of a new species, allied to *L. Wilsoni*, but with yellow flowers, collected by Mr. Eyles in Granite country in the Matoppo Hills at an altitude of 5,000 feet.—*G. S. B.*

Lissochilus Mahoni. By R. A. Rolfe (*Bot. Mag.* tab. 8047).—Nat. ord. *Orchidaceæ*, tribe *Vandææ*. Uganda. A deciduous terrestrial orchid. Flowers among the largest of the genus. Sepals 1 inch long, green, veined with brown. Petals, ovate-orbicular, $1\frac{1}{4}$ in. long and broad, rosy lilac, slightly darker behind. Lip 8-lobed, $1\frac{1}{4}$ in. long; green, with brown nerves.—*G. H.*

Lissochilus Ugandæ. By R. A. Rolfe (*Bot. Mag.* tab. 8044).—Nat. ord. *Orchidaceæ*, tribe *Vandææ*. Uganda. A terrestrial tuberous herb. Flowers 2 in. long, yellow; apex of sepals purple-brown.—*G. H.*

Listrostachys bidens. By W. B. Hemsley (*Bot. Mag.* tab. 8014).—Nat. ord. *Orchidaceæ*, tribe *Vandææ*; West Tropical Africa. A free-growing and profusely flowering orchid with small fragrant flowers, pinkish-white.—*G. H.*

Listrostachys Monteiroæ. By R. A. Rolfe (*Bot. Mag.* tab. 8026).—Nat. ord. *Orchidaceæ*, tribe *Vandææ*; West Tropical Africa. A stout, erect epiphyte, 1-2 ft. high. Racemes 6-12 in. long, many-flowered. Flowers yellowish-white, spurs yellow, 2 in. long.—*G. H.*

Loblolly Pine in Eastern Texas. By R. Zon (*U.S.A. Dep. Agr. Forest Service Bull.* 64).—There are three pines indigenous to Texas, but the loblolly (*Pinus Tæda*) has by far the widest distribution, it being found in commercial quantities over an area of about 5,000 square miles. The economic importance of the tree for cross-ties is very considerable, and has increased largely since the chemical treatment to prevent timber from decay has come so much into use.

Although generally described in our text-books as preferring sandy wastes, it would appear that the loblolly pine grows on lands which are being gradually transformed from marsh to dry grounds, where it spreads about naturally and reproduces itself freely.

The various tables showing cost of production, yield, and returns per acre are of interest and extremely valuable to the cultivator, and the well-executed illustrations show this pine in its various phases of growth.

A. D. W.

The Luquillo Forest Reserve, Porto Rico. By J. C. Gifford (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* 54).—In 1903 President Roosevelt issued a proclamation in which the eastern portion of Porto Rico was to be set apart as a public forest, the reserve thus created being composed principally of scrub trees, although in that part where the rainfall is plentiful and well distributed there is a heavy growth of timber.

Coffee was at one time the principal product of the island, but to-day the coffee hardly pays for the picking. Instead, however, the fruit and sugar industries are extending.

The various chapters dealing with climate, timber production, forest industries, and recommendations generally are written by one who knows the island well; while the list of trees of the district in the appendix is peculiarly interesting if only from a botanical point of view.

In addition there are eight plates and a map.—*A. D. W.*

Lycaste Locusta. By R. A. Rolfe (*Bot. Mag.* tab. 8020).—Nat. ord. *Orchidaceæ*, tribe *Vandee*; Peru. A tufted epiphyte, 2 ft. high. Flowers dull green, with white fringed margin to the lip. Column arched and white.—*G. H.*

Meconopsis integrifolia. By W. B. Hemsley (*Bot. Mag.* tab. 8027).—Nat. ord. *Papaveraceæ*; Western China and Tibet. A perfectly hardy biennial (alt. 10,000 to 15,500 ft.), 1½–8 ft. high, covered with silky hairs. Leaves linear-lanceolate, 6–12 in. long. Flowers yellow, 5–6 in. diam.—*G. H.*

Melon, Cantaloupe, Rust-resisting. By Philo. K. Blinn (*U.S.A. Agr. Exp. Stn. Colorado, Bull.* 104, Nov. 1905; 10 plates).—The “cantaloupe rust or blight” is the effect of a parasitic fungus, called *Macrosporium cucumerinum*, E. & E., which has for a number of years inflicted serious injury on the cantaloupe industry in Colorado. In 1898 spraying with various fungicides was tried, but for several reasons it was considered unsatisfactory or impracticable. The next step was the development of a resistant strain of cantaloupes. The experiments and observations detailed between 1904 and 1905 show that the Pollock melon was the most rust-resisting strain in cultivation. It is recorded that “the relative merits of the Pollock melon, and the interest created by the investigation of its rust-resisting tendencies, led many growers to plant it this past season, and many other growers are anxious for any evidence toward the improvement of the cantaloupe industry.”

Finally, it is recorded that, “in the light of investigation, the rust-resisting tendencies of the Pollock strain seem to offer the most immediate solution of the rust problem.”—*M. C. C.*

Mistletoes in New Zealand. By Joseph Mayo (*Gard. Chron.* No. 971, p. 105, August 5, 1905).—The writer calls attention to two species of *Loranthus* which are indigenous to New Zealand, but the specific names are not given. One is described as growing readily on many kinds of trees in the North Island, forming large bunches of foliage and shoots, which are covered with crimson flowers about the size of those of a myrtle, and are very conspicuous; the berries are scarlet, and the leaves rather broader than our English species. The other species has greenish-yellow flowers and berries.—*G. S. S.*

Mitraria coccinea (*Die Gart.* No. 84, p. 400, May 20, 1905).—This pretty low-growing Chilean shrub is grown much more frequently on the Continent than in England. There it is usually hardy. The bell-shaped, bright, orange-yellow flowers appear in great number during the summer. It prefers a moist, shady position in the open, but it is also a fine pot plant.—*G. R.*

Momordres buccinator, var. **aurantiacum**. By R. A. Rolfe (*Bot. Mag.* tab. 8041).—Nat. ord. *Orchidaceæ*, tribe *Vandææ*. Tropical America. The flowers embrace a wide range of colour, causing seven "species" to have been created, but all are the same. A tufted epiphyte, leaves oblong, 8-9 in. Flowers subglobose, ranging from ivory white to light green, deep yellow, brownish purple, and speckled.—*G. H.*

Mulching Garden Vegetables. By R. A. Emerson (*U.S.A. Agr. Exp. Stn. Nebraska, Bull.* 80; July 15, 1908).—Bearing in mind that farm gardens, made with considerable enthusiasm in the spring, are apt to suffer from neglect on the approach of dry hot weather, when the rush of farm work is at its height, it seemed advisable to determine by experiment the merits of mulching *versus* cultivation (hosing) in the vegetable garden.

The general result of the test seems to be that mulching produces a heavier return than cultivation, especially in a dry hot summer, but renders the crops more susceptible to early autumn frosts by delaying maturity.

In most cases it is deemed advisable to apply the mulch only when the plant is well established, and when the soil has become warmed; and naturally much depends on the character of the season, and the situation of the garden, upland or lowland.

Mulching was found to be very beneficial in the case of cabbages, tomatoes, beans, cucumbers, potatoes and sweet potatoes; less so for transplanted onions, beet, salsafy, carrots, parsnips, peas and melons; and harmful to lettuce, drilled onions, and sweet corn.—*C. H. C.*

Mushroom-growing, Principles of, and Mushroom Spawn-making. By B. M. Duggar (*U.S.A. Dep. Agr. Bull.* 85, Nov. 15, 1905; with 7 plates).—This bulletin consists of sixty pages, of great interest to mushroom-growers, presenting the results up to the present time of the work on the problems of mushroom culture and spawn-making. As an outcome of this work "spawn of pure-culture origin is now being produced on a very large scale by several growers, and is giving excellent results. This method enables the grower to improve and maintain the most desirable varieties of mushrooms in the same manner as is possible with other plants propagated from cuttings or buds." This work has been carried on in co-operation with the University of Missouri for the past three years. The methods described differ from any hitherto used. They are of more general application, and give far better results.

It is not possible at this time to give more than a few brief suggestions concerning the possibility of cultivating other edible species than *Agaricus campestris*. The determination of the fundamental needs of diverse species will require study during a term of years.

It is stated that the majority of failures in the growth of mushrooms may be attributed either to poor spawn, very poor manure, unfavourable temperature, or heavy watering during the early stages of growth.

M. C. C.

Nannorhops Ritchleana, H. Wendl. By O. Beccari (*Bull. R. Soc. Tosc. Ort.* 11, p. 325; Nov. 1905).—It has formerly been included under

the genus *Chamærops*, but deserves to be placed in a distinct genus. The author has grown one for some years in the open ground near Florence, and it has attained an extraordinarily vigorous growth. It has formed a number of underground shoots, which have sent up a large crown of leaves; the latest unfolded measures 1 m. 85 cm. (4 ft. 5 in.) from the top of the stalk to the end of the median segments. The fronds resemble those of *Hyphæne thebaica*: they are of an intense glaucous colour and coriaceous texture, and although fan-shaped they are not very rigid. There are various forms of the plant, due perhaps to the wide extent of country in the arid regions of Western India, as in Sind, and beyond the Indus, over which it may be found; it is a native of Afghanistan, Punjab, and Beluchistan. The seeds, which he has received both from India and Fez, are variable, some being spherical, others oval, some 8 mm. ($\frac{3}{10}$ of an inch), others 16 mm. ($\frac{7}{10}$ of an inch) in diameter. The seed is very hard, with homogeneous albumen, with a small cavity in the centre. It is xerophilous and of slow development; it will withstand low temperatures.

W. C. W.

Nepenthes Rajah. By W. B. Hemsley (*Bot. Mag.* tab. 8017).—Nat. ord. *Nepenthaceæ*; Borneo. A terrestrial shrub, 4 ft. high. Leaves 5–6 ft. long. Pitchers with capacity of 2 quarts, about half as wide as long, wings fringed. Collar broad, inner margin pectinate, purple.

G. H.

Nepenthes, The Pitchers of. By W. B. Hemsley (*Gard. Chron.* No. 956, p. 241, Apl. 22, 1905, and No. 957, Apl. 29, 1905).—An abstract is given in this article of a paper on the structure of the pitcher in various species of *Nepenthes*, which was read before the Linnean Society. Mention is made of the fact that Sir Joseph Hooker was the discoverer of the carnivorous nature of the pitchers. After describing the nature and the structure of the pitchers, those of different species are described; they differ considerably in size and form. Those of *N. rajah* are the largest; they are sometimes of such a size that they are capable of containing two quarts. Like those of other species, the interior of the pitcher is lined with glands which secrete a digestive fluid; it is calculated that in this species there are no less than 4,000 of these glands to the square inch, so that the number of them must be enormous. The under side of the lid, the collar, and various other parts of the plants bear glands which secrete a sweet fluid which attracts various insects, many of whom fall into the pitchers and are killed, and digested by the fluid which they contain. The number of insects which meet with their deaths in this manner is very considerable. It is mentioned that in a pitcher of *N. Hookeri* which was under observation seventy-three cockroaches were caught within a fortnight; it was emptied three times during that period.

G. S. S.

Nicotiana forgetiana. By W. B. Hemsley (*Bot. Mag.* tab. 8006). Nat. ord. *Solanaceæ*, tribe *Cestrineæ*; Brazil. An annual herb, 2–3 ft. high. Corolla with a crimson limb, 1 in. diameter.—G. H.

Nitrogen Bacteria and Legumes. By C. G. Hopkins (*U.S.A. Exp. Stn. Illinois, Bull.* 94, 2/1904; 5 figs.).—An account of the manner in which nitrogen is taken up by plants, and the part played by the bacteria inhabiting the nodules of plants belonging to the *Leguminosæ*, is given. It is pointed out that in general each species of leguminous plant has its own particular form of bacterium which produces nodules upon its roots, and that unless these particular bacteria are present in the soil no nodules will be formed and the crop will suffer from lack of nitrogen. The bacteria must, therefore, if the soil lacks them, as it will if the crop has never been grown on that soil before, be added—the soil must be inoculated with the bacteria. The bacteria do not thrive on acid soil, and it is well to treat the soil with ground limestone in order to correct any acidity. It is not known how long these bacteria will survive in a soil without a leguminous crop upon which they can feed: certainly for two or three years, but probably for not more than five or six years.—*F. J. C.*

Nuclear Division in the Pollen Mother-cells of *Lilium canadense*. By C. E. Allen (*Ann. Bot.* xix. April 1905, pp. 189-252; four plates).—*L. canadense* was chiefly studied, and *L. tigrinum* and *L. longiflorum* were used for comparison.

The heterotype division is first dealt with. The threads of the spireme during synapsis fuse in the form of two parallel strings. These become convoluted and undergo longitudinal fission. A second longitudinal fission is said to occur later. The homotype division is normal. The paper concludes with a discussion on the bearing of the reduction division with heredity.—*A. D. C.*

Nut Weevils. By F. H. Chittenden, Sc.D. (*U.S.A. Dep. Agr. Year Book*, 1904, p. 299; plates).—Nut-growing would, of course, be a much more profitable industry were it not for the insects which inhabit the kernels, rendering them unfit for food. The chestnut and some others suffer much more than walnuts and almonds. The chestnut crop suffers the greatest loss, and the chief depredators are the larvæ of weevils. It is estimated that in the United States the damage done annually by weevils to chestnuts is about 25 per cent. The larger species (*Balaninus proboscideus*) and lesser (*Balaninus rectus*) are fully described, with illustrations. A natural enemy of the weevil is a small four-winged, wasp-like fly, a Braconid parasite (*Urosigalphus armatus*). The most practical remedy that can be suggested is the early destruction of the "worms" in the nuts by means of bisulphide of carbon, and the observance of clean orchard management and other cultural methods.—*V. J. M.*

Odontoglossum ramulosum. By R. A. Rolfe (*Bot. Mag.* tab. 8081).—Nat. ord. *Orchidaceæ*, tribe *Vandææ*; Colombia. An epiphytic herb, 1½ ft. high. Scape 2½-3 ft. long, paniced. Flowers yellow and spotted with purple, ¾ in. long.—*G. H.*

Oenotheras naturalised. By H. Stuart Thompson (*Journ. Bot.* 506, p. 62; 2/1905).—A record of the establishment of the Patagonian

E. odorata as well as the American *E. biennis*, on the sandhills between Burnham and Brean Down, Somerset.—G. S. B.

Okra, its Culture and Uses. By W. R. Beattie (*U.S.A. Dep. Agr. Farmers' Bull.* 282; figs.).—Okra (*Hibiscus esculentus*), commonly called *Gumbo*, has no great value as a food, but the dried pods are extensively employed in the Southern States of America as a flavouring to meat stews, and as a salad.

It must only be cooked in earthenware vessels, as metals are absorbed by the pods, which are thereby discoloured and even rendered poisonous.

Hints are given for its cultivation, and a descriptive list is added of the different varieties grown.—M. L. H.

Onion Culture. By Fabian Garcia (*U.S.A. Exp. Stn. New Mexico, Bull.* 52; plates).—An increased growth of onions in New Mexico is advocated, and what is called the new method of growing—that is, raising in hot beds and transplanting—is shown to be cheaper and more satisfactory than sowing in the fields and afterwards thinning out.

Hand culture is recommended rather than horse culture, as avoiding the waste of ground between the rows, and irrigation at regular intervals is desirable. Water applied after the onions have had a check from drought is liable to cause splitting of the bulbs. The rule is that onions should have attained the size of a lead pencil before being transplanted, but it is urged that it is more important to transplant in proper time than that the plants should have reached any particular size.

In the Mesilla Valley, onion seed should be sown in the open seed-bed in September or early in October, or later in a cold frame covered with glass. The seedlings should be transplanted at the end of February or early in March.

Nitrate of soda, applied at the rate of 600 lbs. per acre in four different sowings during the season, was found to produce a marked improvement in the yield.—M. L. H.

Orchard Culture, Experiments in. By R. A. Emerson (*U.S.A. Agr. Exp. Stn. Nebraska, Bull.* 79; plates).—Experiments were made in clean cultivation of orchards *versus* various kinds of cover-crops considered chiefly with reference to the two great enemies of fruit trees in Nebraska, viz. summer drought and severe frost.

A plantation of young trees was made before a very dry summer, and divided for purposes of experiment into plots containing seventy-six trees each. In the plot planted with water-melons, beans, or turnips, five trees died of drought. In the plot planted with Indian corn seven trees died of drought. In the plot given clean cultivation all through the summer, two died. In the plot sown with oats, forty-one died. In the plot sown with millet which was ploughed in the succeeding spring, nine died.

The percentage of moisture in this soil in another plot bearing no trees, but sown with rye, was also examined occasionally, and this crop was proved to exhaust the moisture more than any other that was tested and to effect this much earlier in the season, when it would have had a still more disastrous effect upon fruit trees. The high percentage of dead

trees in the oats plot was due rather to the length of the drought produced than to the degree of dryness reached.

The Indian corn plot did not become dry till the middle of July, by which time the trees had made their growth and could more safely bear the lack of moisture.

In the matter of winter-killing, however, the results were quite the other way. Of three plantations of trees, eight in each, one was sown with millet, one with oats, and one was kept cleanly cultivated till October, and in this last plot three trees died during the winter and the rest were badly injured. In the plot sown with oats none died and five were injured. In that sown with millet none died and only three were injured. This difference was to be accounted for by the fact that the presence of a cover-crop stopped the growth of the trees much earlier in the season, and gave them more time to mature their wood thoroughly before winter.

Plates are given showing the great difference in maturity between twigs cut in the middle of September from trees on the late-cultivated plot and from those under a cover-crop.—*M. L. H.*

Orchid Disease, New. By G. Massee (*Gard. Chron.* No. 93, p. 158, fig. 58; Aug. 19, 1905).—The fungus causing this disease is *Hemeleia americana*, which has recently been found in two different places on the leaves of *Oncidiums*. It belongs to the same genus as the well-known "Coffee-leaf disease," which has caused so much havoc in Indian coffee plantations. It is described as "forming bright orange powdery-looking patches of variable size on the under surface of the leaf; corresponding areas on the upper surface of the leaf are of a sickly yellowish-green colour." A Latin botanical description is given.—*G. S. S.*

Orchids, Fertilisation of. By G. T. Grignani (*Rev. Hort.* Sept. 16, 1905, pp. 447-460; 2 woodcuts).—An interesting description of the reproductive organs of orchids and the best manner of effecting crosses.—*C. T. D.*

Ovularia, Supposed species of. By E. S. Salmon (*Journ. Bot.* 506, pp. 41-44, 2/1905, plate; and 507, pp. 99-100, 3/1905).—A demonstration that *Crocisporium fallax*, a fungus described by Bonorden on the living leaves of peas, &c.; *Ovularia Clematidis*, described by Mr. Chittenden (*Journ. R.H.S.* xxviii. p. clxxvii.) on the flowers of *Clematis Jackmanni*, *Ovularia Ranunculi*, and *Oidium leucoconium*, are all four nothing more than the conidial stage of *Erysiphe Polygoni*, the powdery mildew so common on peas, vetches, turnip, ranunculi, &c.—*G. S. B.*

"Pæonies." By George C. Watson. "Notes on the Cultivation of Pæonies." By R. I. Jackson (*U.S.A. Hort. Soc. Mass. Trans.* 1904, pp. 134-157).—The first of these useful papers gives an account of the development of the varieties of pæony from the original forms, giving credit to workers both in America and England. The

second deals particularly with the cultivation of pæonies in an exhaustive fashion, and cites the principal papers written concerning this popular flower.—*F. J. C.*

Pavetta neurophylla and P. Eylesii. By S. Moore (*Journ. Bot.* 506, pp. 47-8; 2/1905).—Description of two new species allied to *P. edentula*, collected by Mr. Eyles at altitudes of 4,400 to 4,500 feet, near Buluwayo and in the Matoppo Hills respectively. Both are white-flowered.—*G. S. B.*

Peach Foliage Injured by Spraying. By F. W. Card (*U.S.A. Exp. Stn. Rhode Island, Rept.* 1908, p. 223).—In one case a peach tree was completely defoliated when sprayed with Bordeaux mixture in May. Paris green containing varying amounts of free arsenious acid (2.84 per cent. to 8 per cent.) was used for spraying, but resulted in serious injury to the trees. Lime added to the solution mitigated the evil, but did not wholly prevent it. It would therefore appear unsafe to spray peach trees with Bordeaux mixture or with Paris green while the trees are in leaf.

F. J. C.

Peach Mildew. By O. B. Whipple (*U.S.A. Exp. Stn. Colorado, Bull.* 107, Feb. 1906; 2 figs.).—The name of this peach mildew is not recorded, but it probably belongs to the *Erysiphei*, as it attacks leaves, twigs, and fruit alike, and is said to be a surface grower; and spraying has been recommended with "Bordeaux mixture." There is no indication that the application of powdered sulphur has been recommended, so that possibly it may not be an oidium of the *Erysiphe* kind.—*M. C. C.*

Pear 'Roosevelt' (*Gard. Chron.* No. 979, p. 243, fig. 92; Sept. 30, 1905).—This new pear has been introduced into commerce by Mr. Chas. Baltet, of Troyes, U.S.A., who says this pear "is destined to bring about a revolution in our fruit gardens and orchards." The fruit is very large, sometimes measuring 16 ins. in circumference. The skin is smooth, of a pleasing whitish-yellow colour fading into lemon, with carmine-vermilion spots on the sunny side. The flesh is snow-white, delicate, sweet and melting, of an agreeable flavour.—*G. S. S.*

Pear Scab. By R. E. Smith (*U.S.A. Exp. Stn. California, Bull.* 163; 12/1904; 9 figs.).—This disease, characterised by a scabby, corky growth on the surface, accompanied by distortion of the fruit, is very prevalent in California, as in most countries where pears are grown. Only the superficial part of the fruit is affected, the flesh being quite sound; but the appearance of the fruit is quite spoiled, and the resulting loss in value is enormous. The disease, which is caused by the fungus *Fusicladium pirinum* Lib., makes its first appearance on the leaves (particularly in 'Winter Nelis') or fruits, when the latter are quite small, as brown, velvety spots or patches on the surface. The fungus also appears on the bark of the young shoots and twigs of the tree, where it is not nearly so conspicuous. The fungus passes the winter upon dead leaves on the ground and on the bark of the twigs. As the result of experiment it is recommended (1) to clean up or plough in all dead leaves; (2) spray with the lime-sulphur-salt wash every other year as late in

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winter as possible; (8) spray with Bordeaux mixture (copper sulphate 8 lb., quicklime 10 lb., water 50 galls.) as soon as the tips of the green leaves are visible beyond the bud scales, and again about ten days later with a weaker solution (copper sulphate 5 lb., quicklime 7 lb., water 50 galls.). (See also JOURN. R.H.S. xxviii. 298.)—*F. J. C.*

Peliosanthes Teta Andr., var. **Mantegazziana** Pampanini. By R. Pampanini (*Bull. R. Soc. Tosc. Ort.* 2, p. 50, Feb. 1905).—This graceful plant was obtained from seed from Penang in 1901 through Professor P. Mantegazza; it is distinguished from the type chiefly by the foliage, which constitutes its special character. While the type has rigid, broadly ovate-lanceolate leaves, with a petiole shorter than the blade, the variety is more delicate in habit, the leaves more flexible, with the petiole longer than the blade, which is narrowly linear-lanceolate and very acuminate. There are 8.5 parallel, projecting veins, of a deep green colour, which add to the gracefulness of the leaf. Its long, elegant spike of tiny flowers is of a pale green colour, absolutely scentless, and of short duration. Its culture is not difficult. Hitherto the writer has cultivated it solely in a hot-house, but is convinced it can also be grown in a cold one, as its native habitat is in the moist, not very warm, mountain forests of Malabar, the Himalayas, the Malay Peninsula and adjoining islands. As they are plants possessing rhizomes, and of robust vitality, they should come into favour with horticulturists.—*W. C. W.*

Peppermint. By Alice Henkel (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 90, Part III.; figs.).—A detailed description of peppermint growing and distilling in the United States, where planters and agents have made a determined effort to capture the British market for peppermint oil.

The countries where the peppermint is cultivated most extensively are still England, the United States, and Japan. In this last country it has been grown before the Christian era, but the plant cultivated is not *Mentha piperitis vulgaris* or *officinalis*, as with us and in America, but *Mentha arvensis piperascens*, which is different not only botanically, but in taste and smell.

Peppermint oil to the value of \$31,798 was exported to this country by the United States in the fiscal year ending June 30, 1904, and a good deal was also sent to various British colonies.—*M. L. H.*

Pernettya mucronata. By W. B. Hemsley (*Bot. Mag.* tab. 8023).—Nat. ord. *Ericaceæ*, tribe *Andromedææ*; South Chili and Patagonia. Cultivated since 1830. It is very variable, with white, rose, and purple berries; corolla small, white.—*G. H.*

Petasites japonicus. By W. B. Hemsley (*Bot. Mag.* tab. 8032).—Nat. ord. *Compositæ*, tribe *Senecionidææ*; Eastern Asia. This has the largest leaves of any species, the stalks being taller than a man, the blade being 3 ft. across. Flowers appearing before the leaves, white, densely corymbose.—*G. H.*

Phyllostachys nigra. By O. Stapf (*Bot. Mag.* tab. 7994).—Nat. ord. *Gramineæ*, tribe *Bambusææ*; China and Japan. A stoloniferous

shrub with numerous culms, over 20 ft. in height. Leaf-blades 2-5 in. long.—*G. H.*

Pinanga maculata. By C. H. Wright (*Bot. Mag.* tab. 8011).—Nat. ord. *Palmae*, tribe *Areceae*; Philippine Islands. Stems caespitose, slender, 3½ ft. high, brownish-purple. Leaves elliptical, bifid, green with darker spots.—*G. H.*

Pineapple, Varieties of. By H. H. Hume and H. K. Miller (*U.S.A. Exp. Stn. Florida, Bull.* 70, 2'1904; 10 plates, 4 figs).—A description of the plant is given, followed by Mr. Munro's classification of the varieties, taken from *Trans. Hort. Soc. of London*, Ser. 2, i. 1-84, 1885. The authors find this classification inapplicable for their purposes, and suggest another based on the characters of the fruit. The varieties in cultivation are then fully described, and chemical analyses of the fruits given.—*F. J. C.*

Phlomis lunarifolia, Sibth. et Smith, and some species confused with it. By H. S. Thompson (*Ann. Bot.* vol. xix. July 1905, pp. 389-441).—Critical notes, with a description of a new species, *Phlomis grandiflora* Thompson.—*A. D. C.*

Plant Diseases in the State, Report. By John L. Sheldon (*U.S.A. Exp. Stn. West Virginia, Bull.* 96, June 30, 1905; 6 plates).—This bulletin contains brief references and reports upon about fifty plant diseases; but, unfortunately, their value is very much diminished by the absence of all scientific definition of the fungus causing the several diseases, which are simply characterised by their common and popular names.—*M. C. C.*

Plant Nutrition and Cure by Injection. By D. Boris (*Rev. Hort.* May 1, 1905, pp. 211-215).—Reports of numerous experiments made to determine the effect upon diseased and weakly vegetation of injections of various salts for curative or stimulative purposes. The operation is effected by boring holes into the tree, inserting a powder or a solution, and then closing the orifice with mastic. According to the figures given, the results are often very striking. Several recipes are given for the nutrients and remedies.—*C. T. D.*

Plants and Fruits, New and Rare. Anon. (*Gard. Chron.* No. 941, p. 17, Jan. 7, 1905, and No. 943, Jan. 21, 1905).—In the first of these papers is given an account of the best novelties in hybrid orchids of the past year, arranged under the names of those who raised them, also a list of new and rare orchids which have been illustrated in the "Gardeners' Chronicle" in 1904. In the second paper is given a list of the new and rare plants, fruits, &c. of special interest, which have been illustrated in the same paper.—*G. S. S.*

Plectranthus crassus. By N. E. Brown (*Bot. Mag.* tab. 8030).—Nat. ord. *Labiatae*, tribe *Ocymoidae*; Nyasaland. An herbaceous plant, 2½-3 ft. high. Inflorescence terminal, branched. Corolla light blue, hairy.
G. H.

Poinsettia, A double (*P. pulcherrima plenissima*). By Ed. André (*Rev. Hort.* March 1, 1905, p. 109, and June 16, pp. 294-296; coloured plate).—A splendid form with numerous large bracts of intense scarlet colour. A similar form appeared in England about thirty years ago, but is apparently lost to cultivators. This, therefore, is a fresh sport introduced by M. Demôle, Cannes. The history of both introductions is given.—*C. T. D.*

Potato Diseases and their Treatment. By B. T. Galloway (*U.S.A. Dep. Agr. Farmers' Bull.* No. 91, 1899; with 4 cuts).—A popular summary of the chief diseases to which potatoes are liable, with the most approved remedies. Issued by the Department for the information and assistance of farmers and other potato-growers in the States, but containing nothing novel to call for remark.—*M. C. C.*

Potatoes, Disease-resistance in. By L. R. Jones (*U.S.A. Dep. Agr. Bull.* 87, Dec. 5, 1905).—The aim of this bulletin is to present in concise form what is known about disease-resistance in potatoes. Certain minor diseases of obscure nature are first considered. Scab diseases are in most cases parasitic, but the severity is less in Europe than in America. Of stem diseases the commonest is 'blackleg,' which is a bacterial disease. 'Factor' and 'Up to Date' showed a considerable degree of resistance in England. 'La Czarine' and other varieties are reported to show resistance to a bacterial stem disease in France.

Disease-resistance in potatoes to *Phytophthora* is relative, not absolute; no variety known being wholly proof against late blight and rot. It seems related to general vegetative vigour, and is therefore in a measure dependent upon cultural and developmental conditions, and tends to decrease with the age of the variety. It can be restored by originating new varieties from seed, especially of hybrid origin. Not all seedlings show superior disease-resistance.

The use of other species of tuber-bearing solanums for hybridising offers some promise, but no practical results have yet been secured.

Possibly the disease-resistance in established varieties can be improved by selection, but this has not been proved. Early varieties may escape disease by maturing before it becomes epidemic, but when similarly exposed are less resistant than late varieties.

The source of seed tubers is a matter of importance, northern-grown seed giving plants of superior disease-resistance in Europe; seed from a crop that was not too highly fertilised is probably preferable. Possibly tubers are better for seed purposes if dug before they reach full maturity.

High fertilisation, especially nitrogenous, lowers the power of the plant to resist both blight and rot.

Varieties relatively rich in starch are more resistant to rot; those richer in protein are more susceptible to it.

So far as skin characters are an index, the red varieties with thick and rough skin seem more resistant, as a class, than the thin-skinned white varieties.

So far as stem and foliage characters are concerned, the evidence

favours the stem that is hard, rough, and rather woody at the base, and the leaf that is small, somewhat rough, and dark coloured.

The varieties rated highest, as to disease-resistance in England, are 'Evergood,' 'Discovery,' 'Royal Kidney,' 'Northern Star,' 'Sir John Llewelyn,' 'King Edward VII.,' 'Eldorado,' and 'Factor.'

In Germany and Holland, 'Mohort,' 'Irene,' 'Geheimrat Thiel,' 'Professor Wohltmann,' 'Boneza,' 'Eigenheimer,' and 'Paul Kruger.'

In America, among those which have been widely tested, the following deserve mention as of the resistant class: 'Dakota Red,' 'Rustproof,' 'Irish Cobbler,' 'Sir Walter Raleigh,' 'Doe's Pride,' and 'White Beauty.' Certain European varieties of the disease-resistant type seem to retain that character when grown in America—e.g. 'Professor Maereker' and 'Sutton's Discovery.'

The evidence at hand seems to justify the hope that the efforts of potato specialists may result in the development of varieties combining general excellence with a high degree of disease-resistance.—*M. C. C.*

Potatoes, Disease-resistance in. By William Stuart (*U.S.A. Exp. Stn. Vermont, Bull.* No. 122, April 1906).—This bulletin records the number of tests made since 1905. It states the object of trials to be three-fold. The resistance (1) of vines to blight; (2) of tubers to rot; (3) of the tubers to scab. It consists of tables of the trials and results.

1. Examination of the data shows that, barring "rust-proof," all the varieties showing relatively high disease-resistance were of German or Dutch origin.

2. It was found that the Dutch, German, and Scotch varieties showed much less rot than did the French and American varieties.

Note that German and Dutch varieties are not pre-eminent in qualities based on commercial standards, and are not at present recommended to American growers.—*M. C. C.*

Potatoes, Disease-resisting. By William Stuart (*U.S.A. Exp. Stn. Vermont, Bull.* 115, May 1905).—This bulletin gives the results of tests on disease-resistance in potato vines in 1903 and 1904. In the latter year the number of varieties tested was twenty-nine, and the results are tabulated. The third table is occupied with disease-resistance of tubers to rot, and the relation of the same to vine resistance. This includes twenty-two varieties. The conclusion is that (1) some varieties are less subject to vine injury than others; (2) some show a greater tuber resistance to rot than others; (3) with some there is a fairly close relation between resistance of vine to disease, and tuber to rot; (4) selection has not given visible increase of resistance.—*M. C. C.*

Potatoes and Potato Culture, Experiments with, for New England. By F. W. Rane and H. F. Hill (*U.S.A. Agr. Exp. Stn. New Hampshire, Bull.* 111; plates).—An analysis, divided under ten headings, of the results of some experiments carried on in New Hampshire.

1. *Ready-mixed v. home-mixed fertilisers.*—There was a slightly larger yield produced by ready-made than by home-made manures, but the cost of the home mixture worked out at about \$7.10 per acre less than the other.

2. *New York and New Jersey formula v. New Hampshire formula.*—The New York and New Jersey mixture produced a slightly heavier crop, but at an increased cost, which practically did away with this advantage.

The two recipes were as follows :—

NEW YORK MIXTURE.

Nitrogen 3·9 per cent., 150 lb. nitrate of soda, 180 lb. sulphate of ammonia.

Phosphoric acid 8 per cent., 750 lb. bone black.

Potash 10 per cent., 800 lb. muriate potash, 120 lb. makeweight.

NEW HAMPSHIRE MIXTURE.

Nitrogen 3 per cent., 150 lb. nitrate of soda, 112½ lb. sulphate of ammonia.

Phosphoric acid 6 per cent., 565½ lb. bone black.

Potash 10 per cent., 800 lb. muriate potash, 875 lb. makeweight.

3. *Amount of potash to use per acre.*—Taking cost into consideration, 10 per cent., or 800 lb. muriate of potash per acre, gives the best results.

4. *All fertiliser in hill v. one-half in hill and one-half broadcast.*—The plot with all the fertiliser placed in the hill produced the largest crop of marketable potatoes.

5. *With v. without farmyard manure.*—The best results were obtained by using 15 cords of farmyard manure and 750 lb. commercial fertiliser per acre, and the advantage to the succeeding crop must also not be forgotten in estimating the value of the extra dressing.

6. *Ploughing v. harrowing in farmyard manure.*—The plots ploughed in bore 15 bushels per acre of marketable potatoes more than the average of the others.

7. *Commercial fertiliser above v. below seed.*—Whether farmyard manure is used or not, it is of equal importance that the chemical fertiliser should be placed above the seed.

8. *Description of varieties.*—‘Delaware’ as a main crop and ‘White Rose’ as an early potato are most highly recommended.

9. *Variety test.*—‘Delaware’ gave the largest crop of the fifty-five varieties tested.

10. *Modern culture.*—The ideal potato soil is deep, friable, retentive of moisture, and well drained. One hundred bushels of potatoes contain about 12·6 lb. nitrogen, 4·5 lb. phosphoric acid, and 30 lb. potash. Remembering this, a study of the nature of his own soil should enable each grower to apply, at the lowest possible cost, the proper amount of plant food required to produce a full crop.

American growers are advised to plant standard and well-tested varieties, and to leave the experiment stations to make trials of the new sorts which are offered at fancy prices by seedsmen.

Blight may be prevented by spraying with Bordeaux mixture.

To destroy the potato beetle, add ¼ to ½ lb. Paris green to each 50 gallons of mixture. To prevent scab, avoid infected seed or tubers and excess of stable manure. If infected stock is used, treat with formalin or corrosive sublimate before planting.—*M. L. H.*

Potato-spraying Experiments in 1904. By F. C. Stewart, H. J. Eustace, and F. A. Sirrine (*U.S.A. Exp. Stn. Geneva, N.Y., Bull.* 264, March 1905; with 16 plates).—During 1904 the station made potato-spraying experiments on a large scale. This bulletin gives the details of fifty-eight different experiments in various parts of the State. In the State ten-year experiments, the gain due to spraying was larger than ever. At Geneva, five sprayings increased the yield 238 bushels per acre, while three sprayings increased it 191 bushels. The gain was due chiefly to the prolongation of growth through the prevention of late blight. The sprayed potatoes contained one-ninth more starch and were of better quality. At Riverhead the gain due to six sprayings was 96½ bushels, and to three sprayings 56½ bushels per acre. In fourteen farmers' experiments the results were equally satisfactory; also in fourteen farmers' volunteer experiments, of which details are given.

Soluble bordeaux, and soda bordeaux were compared with the regular lime bordeaux. Soluble bordeaux increased the yield 11 bushels per acre; soda bordeaux 51 bushels per acre; and lime bordeaux 68½ bushels per acre. The disease fought in this experiment was late blight. Soda bordeaux is not to be recommended, at least not until further tests have been made.

The average loss from potato blight and rot in New York in 1904 was at least 60 bushels per acre. Most of this loss was due to late blight and the rot which follows it. The practice of spraying potatoes for blight is on the increase in this State.—*M. C. C.*

Primula Cockburniana. Anon. (*Gard. Chron.* No. 961, p. 381, fig. 187, May 27, 1905).—This very charming little primrose was exhibited for the first time at Vincent Square on May 23. It differs from all the other specimens of this genus in having rich orange-scarlet blossoms. The stem is about 4 inches high, on the top of which are borne two or three whorls of blossoms; like *P. japonica*, each whorl is composed of from three to six blossoms. A botanical description in Latin is given.

G. S. S.

Primula deorum. By W. H. Stansfield (*Gard. Chron.* No. 947, p. 98, fig. 44, Feb. 18, 1905).—This species is a native of Bulgaria, and has been found growing at an altitude of 8,000 ft. It appears to resemble in general appearance *P. Clusiana*. The flower-stalks are sometimes 8 or 9 inches in height and bear a number of purplish-violet flowers of a most striking character; sometimes as many as twenty flowers are produced at one time. Directions are given as to its cultivation, and a description of its botanical features in Latin.—*G. S. S.*

Primula tangutica. By J. F. Duthie (*Gard. Chron.* No. 968, p. 42, fig. 17, July 15, 1905).—"This very remarkable-looking primula was originally discovered in 1880 by Przewalski, in the Kansu province of Western China." But it has recently been found growing in open grassy places from 11,000 to 13,000 feet above the sea, on the mountains of Szechuan, by Mr. E. H. Wilson. "The flowers have a strong scent, resembling that of *Jasminum sambac*." A botanical description is given.

G. S. S.

Primula tangutica. By J. F. Duthie (*Bot. Mag.* tab. 8048).—Nat. ord. *Primulaceæ*, tribe *Primuleæ*. China. Leaves 2–5 in. long, narrowly oblanceolate. Flowers in whorls, 5–9, drooping, scented. Corolla 4–5 in. diameter, brownish purple.—*G. H.*

Propagation and Cross Fertilisation : Choice of Seed-bearers. By Jules Rudolph (*Rev. Hort.* April 16, 1905, pp. 199, 200).—Some interesting remarks on elimination of defective plants and selection generally with a view to preservation of desirable types.—*C. T. D.*

Prunus Blireiana flore pleno. By Ed. André (*Rev. Hort.* Aug. 16, 1905, p. 892; coloured plate).—Description of a very handsome double-flowering plum with rich brown foliage, distributed by M. G. Boucher, Paris.—*C. T. D.*

Prunus pendula. By O. Stapf (*Bot. Mag.* tab. 8084).—Nat. ord. *Rosaceæ*, tribe *Pruneæ*. Japan. A small tree, branches spreading, pendulous. Flowers 2–5 in racemes. Corolla of rose-colour petals, 3–5 lines long.—*G. H.*

Prunus Pseudo-cerasus. By O. Stapf (*Bot. Mag.* tab. 8012).—Nat. ord. *Rosaceæ*, tribe *Pruneæ*; Japan and China. A tree flowering before the leaves. Flowers in 3–5-flowered corymbs, white with a pink tinge, 1½ in. broad. Pink and double varieties in cultivation.—*G. H.*

Red Gum, The. By A. K. Chittenden (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* 58).—It will be of interest to state that the red gum (*Liquidambar styraciflua*) which, in a strictly economic sense, is a valuable occupant of the moist lands of the lower Ohio and Mississippi basins, has for long been cultivated in this country as an ornamental tree, particularly on account of the beautiful tints displayed by the foliage in autumn and early winter.

In the manufacture of furniture the wood of the red gum has been found of particular value, and has been much in demand during the past five years. Under the name of 'satin walnut' the wood is known in this country, where it enters into the making of furniture and is largely used for wainscoting.

Six beautifully executed plates of the red gum under different conditions of ground go far in elucidating the text.—*A. D. W.*

Redouté, Bibliography of. By B. B. Woodward (*Journ. Bot.* 505, pp. 26–80; 1/1905).—The dates of publication of the parts of "Les Liliacées," "Les Roses" (three editions) and "Choix des plus belles Fleurs," painted by P. J. Redouté (1802–1888).—*G. S. B.*

Rhabdothamnus Solandri. By W. B. Hemsley (*Bot. Mag.* tab. 8019).—Nat. ord. *Gesneraceæ*, tribe *Cyrtandrea*; New Zealand. A hispid shrub, leaves 1 in. long, corolla orange, striped with red.—*G. H.*

Rhipsalis dissimilis var. setulosa. By N. E. Brown (*Bot. Mag.* tab. 8013).—Nat. ord. *Cactaceæ*, tribe *Opuntieæ*; Brazil. Succulent-stemmed plant, 1–1½ ft. high. Flowers solitary, ¾ in. diameter, straw-yellow.—*G. H.*

Rhodesian plants. By A. B. Rendle and others (*Journ. Bot.* 506, pp. 44-54; 2/1905).—Description of a small collection made by Mr. Fred Eyles in Southern Rhodesia and deposited in the National Herbarium. The plants show affinities to those of East and West Tropical Africa and of South Africa.—*G. S. B.*

Rhodora canadensis (*Die Gart.* No. 40, p. 494, July 1, 1905; with illustration).—A deciduous shrub growing about 1½ to 3 feet in height and producing rosy-lilac flowers during the early spring months.—*G. R.*

Romneya trichocalyx. By W. B. Hemsley (*Bot. Mag.* tab. 8002). Nat. ord. *Papaveraceæ*, tribe *Romneyæ*; California. A robust herb, 5 ft. high, leaves pinnatifid. Flowers white, 6 in. diameter.—*G. H.*

Rosa gigantea. Anon. (*Gard. Chron.* No. 949, p. 186, Mar. 4, 1905; fig. in Supp.).—An excellent account is given of the history of this very fine single rose, which is not an easy one to cultivate. Its flowers measure more than 6 ins. across, and vary from a white to a pale primrose colour. It was first discovered in Manipur, but it has lately been found in Southern China. Its fruit is said to be edible, and of the size of a small apple.—*G. S. S.*

Rosa Hugonis. By W. B. Hemsley (*Bot. Mag.* tab. 8004).—Nat. ord. *Rosaceæ*, tribe *Roseæ*; Western China. An erect shrub, 4-5 ft. high. Flowers yellow, 2½ in. across.—*G. H.*

Rosa sericea, var. *pteracantha*. Anon. (*Gard. Chron.* No. 980, p. 260, figs. 98 & 99; Oct. 7, 1905).—The extraordinary feature in this plant is, as its name suggests, its enormously large, flat prickles. These vary from 1 to 2½ ins. in length, their attachment to the stem frequently extending the whole length of the internode. These prickles are thin, translucent, a bright blood-red colour, becoming brown and woody with age. This plant is a native of the eastern frontier of India, and of Western China.—*G. S. S.*

Rose, Enemies of. By P. Lesue (*Rev. Hort.* April 1, 1905, pp. 167-170; coloured plate).—A very interesting article on the various insects infesting the rose and the nature of their attacks, their reproduction and various forms.—*C. T. D.*

Rose with beautiful Fruit (*Rosa microphylla* × *rugosa*). By Maurice L. de Vilmorin (*Rev. Hort.* March 16, pp. 144-5; coloured plate).—Description and illustration of a chance hybrid, the fruits of which are of intense colour, larger and more ornamental than those of *R. rugosa*. Flavour also apple-like. Flower large, pale rose-lilac, but with little substance. Fruit chief feature.—*C. T. D.*

Royal Caledonian Horticultural Society. Anon. (*Gard. Chron.* No. 977, p. 209, Sept. 16, 1905. Portraits in supplement).—In this article a short history of this society is given. The foundation of the society took place on December 5, 1809, at a meeting held in the hall

of the Royal College of Physicians, George Street, Edinburgh, so that it is only four years younger than the Royal Horticultural Society. The meeting consisted of seventeen persons. The objects of the society were "to encourage and improve the cultivation of the best fruits, of the most choice flowers, and of the most useful culinary vegetables": a programme which the society has carried out to the letter. A "seal of cause" was granted by the Town Council of Edinburgh to the society, and two royal charters were received, one in 1824, and the other in 1898. The meetings and shows of the society were held in the hall of the Royal College of Physicians until 1827, when it acquired a garden for the purpose of conducting horticultural experiments. Here the shows were held until 1865, when the society, on the score of expense, was obliged to give up the ground, which was then added to the Royal Botanic Gardens, of which it now forms part. For the next twelve years the society held its shows in the Music Hall in George Street, but since 1878 they have been held in the Waverley Market. Two years after its foundation, the Society began to publish its horticultural papers under the title of "Memoirs," and continued to do so until 1829, when, owing to lack of support, their publication had to be discontinued. This year the society has commenced a new series of "Memoirs." Portraits of the President, other officers, and most of the Council are given in a supplement.

G. S. S.

Rubiaceæ of British East Africa. By S. Moore (*Journ. Bot.* 513, pp. 249-251, and 516, pp. 350-353; 9/1905 and 12/1905).—Descriptions of plants collected by T. Kaessner and preserved in the National Herbarium, including the following new species:—*Oldenlandia Kaessneri*, *O. subtilis* and *O. proliripes*, *Pavetta Kaessneri* and *P. larenoides*, *Tardavel Kaessneri*, *Canthium Kaessneri*, *C. pseudovorticillatum* and *C. pubipes*.—G. S. B.

Rubus innominatus. Anon. (*Gard. Chron.* No. 982, p. 290, fig. 112; Oct. 21, 1905).—This fine bramble was described in 1875 from an imperfect specimen by S. Le M. Moore in the "Journal of Botany." Since then Dr. Henry collected it in Central China, and it is now growing in Messrs. Veitch's establishment. The fruit is of an orange-red colour, and has an agreeable sub-acid flavour.—G. S. S.

Rust Problems: Facts, Observations, and Theories, Possible Means of Control. By Henry L. Bolley and F. J. Pritchard (*U.S.A. Exp. Stn. North Dakota, Bull.* 68, Feb. 1906; 29 cuts).—This bulletin contains a general statement of rust problems illustrated by ascertained facts, as well as theories, with suggestions as to means of control, the latter being chiefly directed to the drainage of the soil, the sowing of clean seed, eradication of wild grasses and weeds from proximity to crops, the destruction of all barberry bushes, proper seed selection, and rotation of crops; but containing nothing especially new, suggesting search for rust-resisting varieties, and the survival of the fittest. It is simply a code of plain instructions for local growers.—M. C. C.

Sagittaria sagittifolia grandiflora superba. By W. Mütze (*Die Gart.* No. 17, p. 197, Jan. 21, 1905).—A hybrid between *S. sagittifolia* and *S. montevidensis*, with fine ornamental foliage and large, white flowers, with a dark central spot. It is quite hardy, and in every respect a superior plant in comparison with *S. sagittifolia* or its varieties.—*G. R.*

Sahara Desert, Agriculture in. By Thomas H. Kearney (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 86; plates).—An account of the population, climate, and date gardens of Oued Souf in the Sahara Desert, prepared with the view of showing the inhabitants of the Salton Basin, and of other hot and arid regions of the South-West, how much has been accomplished under equally unpromising conditions.—*M. L. H.*

Salvia splendens Freudenfeuer. By G. Bartsch (*Die Gart.* No. 16, Jan. 1905, p. 184).—This is undoubtedly the finest and most floriferous variety of the well-known *Salvia splendens*. The rather large blossoms are of a deep scarlet colour, and flower uninterruptedly from August till late autumn. A grand plant for indoor as well as outdoor decoration.—*G. R.*

San José Scale in Kentucky (*U.S.A. Exp. Stn. Kentucky, Bull.* 110; 12/08).—This scale is reported to be spreading in Kentucky owing to its presence in private gardens which are not open to the inspection of the State officials. The lime-sulphur-salt wash is reported to be the most satisfactory for use in Kentucky, and fumigation with hydrocyanic gas the best remedy of all.—*F. J. C.*

San José Scale, Spraying Experiments. By W. E. Britton and B. H. Walden (*U.S.A. Exp. Stn. Connecticut, Bull.* 146; 10/1904; 4 plates).—Comparison between 15 spray-fluids was made, and the results point to the lime-sulphur mixtures as the best for autumn and winter spraying against this pest.—*F. J. C.*

Saxifraga apleulata (hybrid). By T. A. Sprague (*Bot. Mag.* tab. 8048).—Nat. ord. *Saxifragaceae*, tribe *Saxifrageae*, of garden origin. A tufted plant, leaves $1\frac{1}{2}$ in. long, in basal rosettes; flowering stems, $2-3\frac{1}{2}$ in. long, 5-9-flowered. Petals pale yellow, $\frac{1}{2}$ in. long.—*G. H.*

Scale, The Cottony Maple (*Pulvinaria innumerabilis* Rathvon). By J. G. Sanders (*U.S.A. Dept. Agr. Bur. Entom. Circ.* 64; 4 figs.).—Considerable damage has been sustained through the attacks of this scale on *Acer saccharinum* and *Acer Negundo* in America, and it has been found on 47 other species of trees and shrubs in addition. The pest covers the twigs with large, white, flocculent masses, the ovisacs, in June, and the young hatch out from June until August, migrating to the leaves, upon which they live during the summer. The English sparrow, the ladybirds (*Chilocorus bivulnerus* Muls., *Hyperaspis binotata* Sary, and *H. signata* Melsh.) and other insects usually keep this pest within bounds, but at times it is necessary to resort to artificial means of control. The best results have followed treatment with kerosene emulsion (2 gallons kerosene, 1 quart soft soap, 1 gallon water) in the winter, and a much weaker kerosene wash in summer.—*F. J. C.*

Sciadopitys verticillata. W. T. T.-D. (*Bot. Mag.* tab. 8050).—Nat. ord. *Coniferae*, tribe *Taxoideae*. Japan. An evergreen tree, 100 ft. high, with needle-like cladodia in the axils of scales (leaves), in clusters of twenty to thirty, 2–4 in. long. Male flowers ovoid, $\frac{1}{2}$ in. long. Female cone terminal, 8 in. long, $1\frac{1}{2}$ in. broad. Ovuliferous scale, $\frac{3}{4}$ in. wide, longer than and adnate to the bract, orbicular rhomboid, fleshy green below with a brown margin.—*G. H.*

Scilla messeniaca. By L. Farmer (*Bot. Mag.* tab. 8085).—Nat. ord. *Liliaceae*, tribe *Scilleae*. Greece. Bulb ovoid, 1 in. in diameter. Raceme 10–20-flowered. Flowers pale blue, 8 lines long.—*G. H.*

Seeds, Dispersal of, by Wind, On the. By H. N. Ridley (*Ann. Bot.* vol. xix. July 1905, pp. 851–868).—Seeds or fruits adapted for dispersal by wind may be put into three groups: (1) Winged fruits or seeds (e.g. *Bignoniaceae*, *Dipterocarpaceae*); (2) Plumed fruits or seeds (e.g. *Compositae*, *Apocynaceae*); (3) Powder-seed, fine and dust-like, as in *Orchideae* and Fern spores.

The author gives an account of his observations in the Malay Peninsula on wind dispersal. *Shorea leprosula* may be taken as an example of a winged-fruited plant with slow migration. A single specimen grows in the Singapore Botanic Garden about 100 feet high in an open spot, and thus having exceptional advantages for dispersing its seeds. One hundred yards from this specimen was the furthest limit that fruit was found, though it was rare for the fruit to be carried further than 50 yards. Calculations made, allowing even for most favourable circumstances, showed that the species would only spread 800 yards in 100 years, and would take 58,000 years to migrate 100 miles.

Other observations are recorded, and the conclusions are as follows: Of the three classes of fruit and seed modified for wind-dispersal, that of *winged* seed and fruit is the slowest. The species migrate very slowly, and are, usually at least, unable to cross any large tract of sea by this means alone. *Plumed* seeds and fruits, though easily and probably quickly disseminated over open country, for which they are most suited, are liable to be stopped in their migrations by dense forests. They can, at least occasionally, cross successfully large areas of sea. *Powder-seed*, on the other hand, has the most rapid transit, probably, of any form of seed, and is most widely diffused.—*A. D. C.*

Seed Selection according to Specific Gravity. By V. A. Clark (*New York Agr. Exp. Stn. Geneva, N.Y., Bull.* 256, October 1904).—It has long been an axiom of practical gardening that heavier seeds (as separated by salt solutions) produce better crops, and some experimenters claim that specific gravity can be used as the distinguishing character of the kind and quality of the seed. The conclusions of the first season's work, however, tend to show that specific gravity, while a character of the variety, is not a *distinguishing* character. Other interesting points have suggested themselves during the research. A quite definite correlation exists between the specific character of a seed and its germination. Seeds of low specific gravity do not germinate at all. Seeds of the highest specific gravity show the highest percentage of germination. There also

appears to be a correlation between the specific gravity of a seed and its viability. Seeds of a specific gravity representing the greatest storage of reserve material are longest lived. There appears to be some correlation between the specific gravity of a seed and the vigour of the resulting plant.—*F. A. W.*

Seed-sowing. By A. Hemsley (*Gard. Chron.* No. 954, p. 212, Apl. 8, 1905).—Sowing seeds is by no means such a simple operation as many persons imagine, and in this paper many useful hints are given as to the best way of insuring their germination.—*G. S. S.*

Seeds, Vitality of. By J. W. T. Duvel (*U.S.A. Dep. Agr. Bur. of Plant Industry, Bull.* 58, 1904).—This bulletin of ninety-six pages gives an account of experiments devised to ascertain the factors governing the viability of seeds. The principal conclusions arrived at are as follows:

The vitality of a seed is determined by its maturity, the weather conditions at the time of harvesting, and the methods of harvesting and curing. Immature seeds will germinate readily soon after gathering, but as a rule rapidly lose their vitality. Seed harvested in damp weather or injured by damp is much weaker than that obtained under favourable conditions. It is necessary to take every precaution to prevent overheating during the curing of seeds, otherwise their vitality is greatly lowered.

"The life-period of any seed, granting that it has been thoroughly mature and properly harvested and cured, is largely dependent on environment." "Moisture is the chief factor determining the longevity of seeds as they are commercially handled," and if proper precautions are taken, the life of a seed may be prolonged greatly beyond that which is known at present, though never for centuries. The evil influence of moisture is greatly increased if the temperature is raised, but temperature is of little moment, when within ordinary limits, in a dry climate, most seeds if carefully dried being able to withstand long exposure to a temperature of 87° C. (98° Fahr.) without injury, but long exposure at 39°–40° C. (102°–104° Fahr.) causes premature death. In a moist situation 30° C. (86° Fahr.) will soon cause injury. The ideal condition for the storage of seeds is to keep them dry and at the same time cool, but usually in practice the best method is to store in well-ventilated rooms kept dry by artificial heat. "This method requires that the seeds should be well cured and well dried before storing." If seeds are not well dried their vitality is best preserved by keeping them at a temperature only a little above freezing point. It is important that the seed should be thoroughly ventilated if the temperature of the storage house is raised, otherwise the increased humidity of the air between the seeds will cause injury.

Seeds may be dried to any degree without injury, and it is necessary to dry them so that they give off no moisture at the highest temperature to which they will be exposed if the best results are to be obtained when seeds are exported to hot climates. If this is done and the seeds be packed in paraffined packages or bottles, they may be preserved as well in one climate as another. Seeds stored under ordinary conditions respire

very freely, and respiration is much more rapid if much moisture is present, while the length of life is inversely proportional to the extent of respiration. Respiration is, however, not essential to the retention of vitality by the seed, and even though respiration be entirely prevented seeds will continue to deteriorate and sooner or later will lose their vitality.—*F. J. C.*

Seeds, Vitality of Buried. By J. W. T. Duvel (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 89 ; 8/1905 ; 3 plates).—Seeds of many plants were buried at various depths in porous pots filled with clay soil, and their vitality is to be tested at intervals. 109 species, representing eighty-four genera belonging to thirty-four different families, are being tested. The present bulletin gives the result after the first year. Thirteen species, including shepherd's purse, hemp, and evening primrose, completely failed ; but the author is of opinion that the results here are not quite reliable. Twenty-four either decayed or germinated and afterwards decayed while buried, including maize, corn cockle, cabbage, wheat, beans, barley, onion, and melon.

Of the remainder the number germinating varied from 5 per cent. in *Festuca elatior* to 96.5 per cent. in chickweed.

"In general the pernicious character of weeds is directly proportional to the length of time the seeds will retain their vitality when buried in the soil."

"The deeper seeds are buried, the better is vitality preserved."

F. J. C.

Shelter to Cultivated Plants. By E. J. Russell, D.Sc. (*Gard. Chron.* No. 953, p. 193, Apl. 1, 1905).—In mentioning the advantages and otherwise of giving shelter to plants, the author says: "Before our knowledge can advance beyond the empirical stage, it is necessary to examine in some detail the effects produced by shelter. I shall consider the question in its two aspects, as it affects the soil and as it affects the plant, and it will be the most convenient for my present purpose to begin with the soil." He then proceeds to discuss the matter under these two heads in a very interesting manner.—*G. S. S.*

***Silene glauca*.** By F. N. Williams (*Journ. Bot.* 514, p. 282 ; 10/1905).—Description of a new species resembling the Algerian *S. Aristidis*, collected by G. F. Scott Elliot in crevices of rocks at an altitude of 840 metres (2,750 feet) on Virgen Hill, in the Andes of Chile. The flowers are white, in 8 to 10-flowered capitulate racemes.—*G. S. B.*

Silver-leaf Disease. Anon. (*Gard. Chron.* No. 971, p. 111, Aug. 5, 1905).—Prof. Percival has recently been making some experiments tending to show that this disease is caused by a fungus belonging to the genus *Stereum*. Plum trees, after being inoculated with this fungus, soon begin to show that they are infected by this disease by their leaves assuming the well-known colour. "The mysterious part of the business is that no fungus threads are to be found in the leaves, and so it is conjectured that the disturbance is caused by some ferment or enzyme

secreted by the fungus which creeps up the stem from the wound." The only remedy that is at present known is to cut away the infected branches.

G. S. S.

Skimmia japonica. By S. A. Skan (*Bot. Mag.* tab. 8088).—Nat. ord. *Rutaceæ*, tribe *Toddaliææ*. Japan. An evergreen shrub with alternate coriaceous leaves. Flowers fragrant, small, polygamous or dioecious; fruit globose, red.—G. H.

Sodium, when used in Nitrate of Soda, Concerning the Function of. By H. J. Wheeler, B. L. Hartwell, and G. E. Adams (*U.S.A. Exp. Stn. Rhode I., Rep.* 1903; pp. 237-267).—It has frequently been observed that the application of common salt has a beneficial effect upon certain crops, though no marked change is brought about in others. Various authorities state that sodium is a necessary element at certain stages in the growth of plants, while others deny the necessity for it *in toto*. Quotations are given in the bulletin showing that the question as to the rôle of sodium in plant nutrition has not yet received a thoroughly satisfactory answer. The principal question discussed in the present contribution is the "manurial action of sodium as an explanation of the superiority of nitrate of soda over sulphate of ammonia." The results of numerous pot experiments bearing upon this point are detailed, and the conclusion arrived at is "that the differences in the yields produced by nitrate of soda and sulphate of ammonia are not attributable, at least more than to a limited extent, and then perhaps only with a few kinds of plants, to a direct manurial action of the sodium, but often chiefly to the difference in the chemical reaction of the soil which is brought about by the two salts," and further that "the greater efficiency of nitrate of soda, as compared with sulphate of ammonia, was not apparently by virtue of the capacity of soda to act as a carrier of nitric acid to the plant." The annual reports of this station for 1894-1899 contain additional results bearing upon this question.—F. J. C.

Stanhopea devoniensis. By Dr. Kranzlin (*Gard. Chron.* No. 970, p. 92, July 29, 1905).—This plant was figured more than sixty years ago by J. Lindley in his "Sertum Orchidaceum," plate 1, and up to the present time it has been considered to be a genuine species. Lately, Mr. P. Wolter, a German hybridist, has raised a plant by crossing *S. tigrina* with *S. insignis*, which bears a flower "so exactly similar to the typical *S. devoniensis* that the most hair-splitting description cannot show any real difference." The question then arises whether *S. devoniensis* is not a natural hybrid.—G. S. S.

Stimuli, The Reactions of the Fruit-bodies of *Lentinus lepideus* to external. By A. H. R. Buller (*Ann. Bot.* vol. xix., July 1905, pp. 427-436; 3 plates).—*Lentinus*, a genus of the Agaricini, generally grows on tree-trunks; the material used in the investigation was obtained from rotten paving-blocks taken from the streets. Before the development of the pileus, the stipe is perfectly indifferent to geotropic stimuli. In the absence of light it is rectipetal, and in its presence positively heliotropic. Whilst the pileus is developing, the stipe alters its reactions to

external stimuli. It becomes negatively geotropic and ceases to be heliotropic. The gills, as they develop, become strongly positively geotropic and can alter their direction of growth, so as to bring themselves into vertical planes.

Fruit-bodies grown in weak light are often abnormal and form branches; these spring from abnormal pilei. In striking contrast with *Lentinus* are such agarics as the common mushroom. Growth in these is normal in sunlit fields or dark cellars. The advantage for spore distribution of a tree-fungus responding to the stimulus of light as well as that of gravity is obvious.—A. D. C.

Streptocarpus Davyi and S. cyaneus. By S. Moore (*Journ. Bot.* 510, pp. 171–172; 6/1905).—Descriptions of two new species collected by J. B. Davy in Swaziland, allied to *S. Bolusi* and *S. Rexii* respectively.—G. S. B.

Streptocarpus grandis. By N. E. Brown (*Bot. Mag.* tab. 8042). Nat. ord. *Gesneraceae*, tribe *Cyrtandreae*. Zululand. A stemless plant. Leaf solitary, 2–3½ ft. long, 1–2½ ft. broad. Flower-stems numerous, to 3½ ft. high. Flowers in pairs, light blue without, white within.—G. H.

Sugar Beet Experiments. By C. D. Smith (*U.S.A. Exp. Stn. Michigan, Bull.* 215; 6/1904).—The sugar-content of the beets grown was found to vary greatly, being frequently over 2 per cent., and in one case 3 per cent., greater in one beet as compared with the one adjacent to it. There is also danger in basing the valuation of beets on analyses carried out some time after the lifting, owing to shrinkage, unless careful note is taken of the weight immediately on lifting. Manures affect the percentage of sugar very little; this depends mainly upon the season, the presence or absence of long-continued sunshine; upon the soil, sandy loams giving better results in some seasons, clays in others; and finally upon the seed. The seed, however, has not so far been selected so as to give a heavy crop of beet with a good sugar-content varying little from plant to plant—a seed that is desirable. Rotation of crops must be resorted to. The best results were obtained by planting the rows twenty-four to twenty-eight inches apart. Nitrogenous manures, and usually those providing potash and phosphoric acid, produced a paying increase in the yield. The leaf-blight can be kept in check by spraying with Bordeaux mixture; but there seems to be room for improvement in the machinery available for spraying.—F. J. C.

Sugar Beet, Influence of Environment on Composition of, 1903. By H. W. Wiley (*U.S.A. Dep. Agr. Bur. Chem. Bull.* 95, 1905).—Continuation of previous reports. Shows that the amount of sugar in the canes increases as the latitude decreases: the greater the light, the greater the quantity of sugar developed. Light is more important than clear sunshine, since the radiations of the sun, which are most active in stimulating the cellular activity of plants, seem to suffer no marked diminution of power in passing through strata of aqueous vapour. The data for 1903 are otherwise less decisive and complete than in previous years.—F. A. W.

Sugar-cane Industry, and Experiments (*W. Ind. Bull.* vol. vi. No. 4, 1906).—This number is devoted entirely to reports and papers on the sugar-cane industry in the West Indies.—*M. C. C.*

Sugar-cane, Review of the Insect Pests. By H. A. Ballou, B.Sc. (*W. Ind. Bull.* vol. vi. No. 1, 1905).—This communication includes descriptions of the "moth borer," the "hard back," the "weevil borer," the "root borer," the "cane fly," scale insects, the "shot borer," the larger moth borer (chiefly devoted to the latter), called *Castnia licus*, with the latest information relating thereto.—*M. C. C.*

Sugar-cane, Review of the principal Fungoid Diseases. By L. Lewton-Brain, B.A., F.L.S. (*W. Ind. Bull.* vol. vi. No. 1, 1905).—This notice includes three diseases of the sugar-cane, called respectively "rind disease" (*Trichosphaeria sacchari*), "pineapple disease" (*Thielaviopsis ethacetica*), which attacks cane-cuttings, and "root disease" caused by *Marasmius sacchari*; the whole supplemented by a bibliography of sugar-cane diseases.—*M. C. C.*

Sugar-cane, Top-rot Disease (*Qu. Agr. Journ.* vol. xvi. part 8, May 1906).—Summary of the top-rot disease of sugar-cane in Queensland. Gives particulars of the disease, its appearance, distribution, damage, and methods for checking it. It is not a constitutional malady, but essentially a root disease, due to a chemical change initiated by the secretion of a parasitic fungus. First recognised near the centre of the heart of the stalk, or young sprout; the leaves are paler than usual, the leaf-sheaths are discoloured, the stalks become brownish, and finally collapse. Some growers hold that the disease travels from plant to plant. Insufficient drainage appears to have much to do with the outbreak of disease.—*M. C. C.*

Swainsonia maccullochiana. By T. A. Sprague (*Bot. Mag.* tab. 7995).—Nat. ord. *Leguminosae*, tribe *Coluteae*; North-West Australia. An erect, sparsely pubescent shrub, 8 feet high. Leaves with 8-13 pairs of leaflets, racemes of many large reddish-purple flowers.—*G. H.*

Sweet Potatoes. By D. M. Nesbit (*U.S.A. Dep. Agr. Farmers' Bull.* 129; 1902).—This article treats of *Ipomoea Batatas* from an economic point of view. Interest in this tuberous root as an article of food has greatly increased of late, with the result that varieties and methods of propagation, harvesting, shipping, and cooking have been improved. Inventors are actively improving machinery and processes for the production and utilisation of the by-products, such as flour, starch, glucose and alcohol, and lastly the value of both the vines and roots for stock feeding is only beginning to be understood.

The sweet potato requires a warm climate, with a temperature not lower than 45°, and is perennial where there is no frost. It does not suffer from drought, but from excessive rainfall and over-irrigation. A well-drained, light, sandy loam meets its needs, with potash, nitrogen, and phosphoric acid as fertilisers.

Propagation is effected by rooted sprouts, cuttings, or pieces of the

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tubers. These latter are very easily bruised, and for shipping must be handled with great care.

Jersey Sweets and Southern Sweets are the best known on the market. The first have the best reputation for packing and grading, but just as good tubers can be produced in the Southern States, where, however, methods of marketing are old-fashioned and unsatisfactory.

Storing prolongs the season, which is from August to May, but only sound tubers should be kept for this purpose. Canning and desiccating sweet potatoes form an important industry in several States.

Recipes for cooking are given, and it should be borne in mind that though twenty minutes' cooking renders the tuber eatable, its flavour is infinitely improved by an hour in the oven.

In 1900 a partially successful attempt was made to introduce American Sweet Potatoes to the English and French markets. "It will be necessary to educate the Britisher up to them," but that done, experts consider that a remunerative trade might be built up. They can only be imported into France as 'yams,' potatoes being prohibited.—*C. H. C.*

Temperature, Abnormally High, A List of Plants which have benefited by. By E. Morel (*Rev. Hort.* Jan. 1, 1905, pp. 21-23).—A very interesting list of outdoor plants which have flourished unusually under trying conditions of heat and drought; compiled as a guide to planting in exposed positions.—*C. T. D.*

Terms used in Forestry and Logging (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* 61).—This is a useful compilation of some of the terms used in forestry and logging, and will meet a want that has long been felt, especially by those who are outside the life of the forester and lumberman. I cannot but think that our term 'leaf-canopy' is preferable to and more understandable than 'crown-canopy,' and might with advantage be substituted. There are many omissions, such as notch planting, stubbing, bark-stripping and flawing, coppicing, timber haulage, lopping and foreshortening branches, and laying in a tree preparatory to felling.

But additions are asked for; and altogether the work, of some fifty pages, must prove both instructive and useful.—*A. D. W.*

Tetradlea thymifolia. By L. Farmer (*Bot. Mag.* tab. 8028).—Nat. ord. *Tremandraceæ*; E. Australia.—A much-branched under-shrub. Leaves verticillate, flowers tetramerous, petals rose-coloured, 4 lines long.
G. H.

Timber, Preservation of. By H. von Schrenk (*U.S.A. Dep. Agr. Bur. of Forestry, Bull.* 51, 1904; 6 figs.).—The results of the treatment of various timbers with the object of checking decay are given in this bulletin. The timbers were laid as railway ties in Texas, where they would be subject under normal conditions to rapid decay. The untreated timbers, particularly hemlock, tamarack, loblolly pine and beech, showed marked decay, and long-leaf pine almost as much, while oak showed greater resistance. Timbers treated with zinc chloride, the Wellhouse treatment, the Allardye treatment and spiritine treatment show practically no signs of decay. Other treatments were tried, but the

method of application in certain cases left something to be desired. The experiments had been in progress about two years.—*F. J. C.*

Tobacco, Wilt Disease of. By R. E. B. M'Kenney (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 51; 1 fig.).—A short note on the "wilt" disease in tobacco, which is still under observation, but which has been already proved to be of a highly infectious nature, and to be produced by the presence in the woody parts and stem of a fungus belonging to the genus *Fusarium* (*Neocosmospora*).

It is advised that land which has produced an infected crop should be rested for at least five years; all diseased plants should be burnt on the spot; all tools and ploughs used among them should be cleaned with soap and water before removal to other places; and even the destruction of barns and manure sheds in which any infected tobacco has been stored is recommended.

No fertiliser containing kainit or muriate of potash should be used, and in soils deficient in lime an application of fifty bushels to the acre may prove advantageous, though this must be used with care, as too much lime causes the leaf to burn poorly.—*M. L. H.*

Tomato Diseases in California. By R. E. Smith (*U.S.A. Exp. Stn. California, Bull.* 175, 1906; 8 figs.).—The diseases treated of are:

1. "Damping off," soil sterilisation being the means of prevention suggested. Seed-beds should be made of fresh soil, the seed sown thinly, and the surface of the soil kept dry after seedlings appear; a sprinkling of air-slaked lime aiding this.

2. "Summer blight," often causing great havoc and apparently caused by a species of *Fusarium*. The symptoms are very similar to those of the disease known as "sleepy disease of tomatoes." Experiments are in progress with this disease.

3. "Winter blight," caused by *Phytophthora infestans*, is very prevalent on leaf and fruit in the damper days of the winter, and the use of Bordeaux mixture is strongly recommended.—*F. J. C.*

Tomato Forcing. By W. J. Green and C. W. Waide (*U.S.A. Agr. Exp. Stn. Ohio, Bull.* 153, August 1904; illustrated).—A list of the results in connection with forcing tomatoes as a spring and early summer crop in Ohio. The crop is a profitable one, and with due attention to a few essential points, such as hand pollination, temperature, sub-irrigation and mulching, not difficult to secure.

The best results are given by plants trained to one stem, and set one foot apart. Seed is sown December 1, plants put out in beds middle of March, and the fruit is beginning to ripen about June. The average yield was one and two pounds per square foot, and average price 12 cents per pound. The white fly was the most troublesome pest; remedy, fumigation with hydrocyanic gas.—*C. H. C.*

Tomatoes. By L. C. Corbett (*U.S.A. Dep. Agr. Farmers' Bull.* 220, 1905; illustrated).—The tomato is an important article of commerce in America, and is here considered (1) as a field crop in the North, *i.e.* east of the Mississippi and north of Washington; (2) in the Southern

States, especially Florida and Texas; (3) as a suitable crop for forcing for a winter supply; and (4) as a field crop for supplying canneries.

In the first case, the seed is sown about the middle of March and transplanted to the field about June 1.

In the South it is naturally sown much earlier; in Northern Florida in January, and the plants set out in March.

Cultivation of the tomato for canning purposes may be most successfully practised, provided care is given to the selection of the variety, the growing of the plants, fertilising and cultivation.—C. H. C.

Trees: various Operations to obtain Symmetrical Growth.

By George Bellair (*Rev. Hort.* May 1, 1905, pp. 210–211; 8-woodcuts).—The development of lateral growths is stimulated or retarded by means of V or Λ shaped incisions above or below the starting point—the V cut beneath retarding and the Λ cut above accelerating growth. Retarding is also effected by partial strangulation by means of 20 or 30 spiral coils of string round the base. Depression to the horizontal of vigorous upward growths also retards perpendicular elevation of weakly ones. Several other methods are mentioned, but the above appear to be the more important.—C. T. D.

Tulipa linifolia. By C. H. Wright (*Bot. Mag.* tab. 7998).—Nat. ord. *Liliaceæ*, tribe *Tulipeæ*; Turkestan. This has narrow, wavy leaves and crimson petals, with a black-purple spot inside the base, and purple stamens.—G. H.

Turraea Eylesii. By E. G. Baker (*Journ. Bot.* 506, p. 45; 2/1905). Description of a new species, a large shrub with cream-coloured flowers, allied to *T. obtusifolia* and *T. mombassana*, found by Mr. Eyles among granite boulders on the Matoppo Hills, at an altitude of about 5,000 feet.—G. S. B.

Uredinæ, On the Vegetative Life of some. By Jakob Eriksson (*Ann. Bot.* xix. 1905, pp. 55–59).—The paper is a further defence of the author's mycoplasma theory. Some recent experiments on wheat and rye are recorded, and also the results of a cytological investigation of the corn rust fungus.

In certain experimental plots an outbreak of rust occurred in the beginning of July. Leaves from these plots had been carefully examined in October and November, and also at intervals from April to July, but no mycelium could be detected. The outbreak, therefore, does not arise from a perennial mycelium, as none was present. The well-known mycoplasma hypothesis is then put forward as the explanation.

The mycoplasma is supposed to exist as a protoplasmic substance within the cells of the host-plant, and at certain seasons it escapes from the cells and forms an intercellular mycelium of the rust fungus. Cytological details are given.—A. D. C.

Vanilla Humblotii. By R. A. Rolfe (*Bot. Mag.* tab. 7996).—Nat. ord. *Orchidaceæ*, tribe *Neottieæ*; Madagascar. A tall, leafless climber, with fleshy stems and yellow flowers, 5 in. across the lip, with rosy-crimson lines.—G. H.

Variegation, Transmission of, by Grafting. By G. T. Grignan (*Rev. Hort.* April 16, 1905, pp. 108-4).—Further report on M. Lindemuth's experiments. *Abutilon Thompsonii* has transmitted its variegation to other members of the Malvaceæ, producing *Kitaibelia Lindemuthi*, *Malvastrum Lindemuthi*, &c., as variegated novelties of merit. There appear to be two kinds of variegation, one constant and transmissible by seed, the other a contagious affection and not transmissible by seed but by graft infection. The last M. Lindemuth considers rare, and so far only determined in *Abutilon*.—C. T. D.

Vines, Ring-barking of (*Rev. Hort.* Jan. 1, 1905, p. 6).—It is recommended by M. Charmeux, of Thomery, that for late-fruited vines a very narrow ring of bark be cut out at the flowering time just below the bunch. This is claimed to stop the descent of sap, by which operation the fruit benefits.—C. T. D.

Violet 'Cyclopi.' By S. Mottet (*Rev. Hort.* Nov. 1, 1905, p. 520; 2 woodcuts).—A violet of good habit and large blue flowers, distinguished by a set of small central nearly white petals. Distributed by Vilmorin.
C. T. D.

Vitis Ampelopsis Henryana. Anon. (*Gard. Chron.* No. 983, p. 809, fig. 122; Oct. 28, 1905).—Was discovered by Dr. Henry in Central China. It is much like the old Virginian creeper, but its colour is "even more gorgeous, and the nerve in the centre of each leaflet is marked by a silvery band. The colour of the young leaves is a brilliant translucent scarlet, passing, as the leaves get older, into a rich carmine, and ultimately into a ruddy bronze with the silvery marking before mentioned. It is, we believe, quite hardy."—G. S. S.

Wattle, Australian, Cultivation of. By David G. Fairchild (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 51; plates).—A description is given of an Australian wattle plantation in Natal, with a view to the introduction of the wattle by American cultivators into Hawaii.

The bark of the Australian wattle (*Acacia mollissima*) has long been in use for tanning purposes, and in Natal, where it grows as well as in its native country, its cultivation yields a handsome profit; the trunks, after being stripped of bark, being valuable as pit props.—M. L. H.

Wild Rice Seed, Storage and Germination. By J. W. T. Duvel (*U.S.A. Dep. Agr. Bull.* 90, Feb. 21, 1906; 2 plates).—This bulletin details the distribution of *Zizania aquatica*, habitat, germination of the seed, directions for storing, and results of storage experiments. As dried seed will germinate but rarely, directions are given for storage without deterioration, packing for transportation, sowing, and general germination tests at temperatures varying from 15° to 30° C. (60° to 86° Fahr.), the maximum being about 35° C. (95° Fahr.). Wild rice is of importance as a food for water-fowl, a delicious breakfast food for man, and will grow luxuriantly in warm or cold water.—M. C. C.

Yantias or Taniers of Porto Rico. By O. W. Barrett (*U.S.A. Agr. Exp. Stn. Porto Rico, Bull.* 6, April 1905; illustrated).—This interesting pamphlet (the first on the subject) was published to remedy

the confusion which existed in many minds between the yantia or tanier of tropical America and the taro of the Caribbean region.

Both belong to the family of the *Aracea*, of little value as a whole to agriculture, but containing the important tribe *Colocasieæ*, which includes the taro (*Caladium*) of Polynesia, the alocasias of the Orient, and the West Indian genus *Xanthosoma*, which embraces the varieties known as the taniers, tamiras, cocoos, or eddoes, in the British West Indies, as "taye" in the French West Indies, and as "yantia" or "malanga" in the Spanish Antilles.

Yantia was the name given to the plant by the Arawaks at the time of the arrival of the Spaniards. It is probably the oldest cultivated crop in the world, and it has lost the power of reproduction by seed under cultivation. This condition is shared in a much less degree by the yam, banana, and sweet potato, and goes far to prove its antiquity.

There are numerous varieties (fifteen in Porto Rico), which belong to three species: *Xanthosoma sagittifolium*, *X. atrovirens*, and *X. violaceum*. The varieties are extraordinarily local. Cultivation extends between Southern Mexico and Southern Brazil.

The yantia is native to tropical America, and scarcely known outside this district. The experiment station of Porto Rico is distributing it to other parts of the world, including Manila, Singapore, Queensland, Lagos, and the Gold Coast of West Africa.

Some of the wild varieties (which are not eaten) contain raphides (crystals of calcium oxalate) in large quantities in the "madre" or lower portion of the stem. This fact is turned to account by the natives, who use the juice to kill grubs in sores on cattle and horses.

The tuberous offsets of the rootstock are principally eaten, though in times of scarcity the "madre" is also used, but it is fibrous and hard. The leaves are boiled and eaten as spinach. The tubers, which are red, white, or yellow, also produce starch and flour. The starch is probably as good as that made from cassava, while the flour is better, being entirely free from hydrocyanic acid.

"Rolliza" is the best variety, both as regards earliness and productiveness.

The plant is propagated by cutting off the top or "head," which produces a strong, clean growth. The tubers or any part of the rhizome with eyes may be used, but these are more liable to throw up suckers, and to be weak.

Whatever the conditions of its cultivation, a crop of tubers is certain, but, like all aroids, it requires a certain amount of moisture. Being easy to cultivate, adaptable to various conditions, and very productive, the yantia may be considered superior to either the yam or the sweet potato. Its normal price is a little less than the former, but nearly double that of the latter.

The bulletin is well illustrated, and recipes for cooking the yantia are given at the end.—C. H. C.

***Yucca guatemalensis*.**—By W. B. Hemsley (*Bot. Mag.* tab. 7997). Nat. ord. *Liliaceæ*, tribe *Dracaneæ*; Central America. A tree 40 ft. high, 6 ft. in girth. Flowers white, or tinged with yellow, 8 in. diam.—G. H.

A NEW FORM OF FERN REPRODUCTION.

By CHAS. T. DRUERY, V.M.H., F.L.S.

IN recent years the normal course of fern reproduction has been found in exceptional cases to be replaced by many variants, so many, indeed, that every one of the various phases of the life-history of a fern has been found wanting, even to the very fronds which represent the fern as we know it. The missing phases are due, as it were, to jumps from one phase to another, which normally would require one or more intermediate ones. Thus, to take an extreme case, the normal course of fern production by the spore is the spore which grows into a prothallus, or little green scale, which then bears two kinds of organs beneath it, one of which fertilises the other and produces what is to all intents and purposes a seed. This seed then germinates and produces a fern, upon the fronds of which the next series of spores is borne. The extreme short cut is that the little green scale produced by the spore produces spores direct, and another short cut on different lines is seen where the fern fronds bear the green scales at their tips, and these green scales bud apogamously direct into ferns again. But, so far, all these peculiarities have occurred in connection with varietal forms of ferns or sports, in which, however, although the fronds have been modified in make, they have been of ordinary size, and subject to the specific deciduous or non-deciduous nature peculiar to the family. Furthermore, they were only locally modified either at their tips or at the backs, where spores normally are borne. In the new case, however, which came under my notice in the late summer of 1904 some entirely fresh features presented themselves. A small piece of normal *Cystopteris montana*, of which species no varieties are recorded, was sent to me from Scotland in 1903 somewhat late in the season. The result was that it apparently perished, and in the subsequent spring I was emptying the little pot when I detected a minute green speck, indicating vitality, and consequently repotted it, with the result that during the summer it sent up two small normal fronds. In July I noticed that at the base of one of these, on an exposed portion of the creeping rhizome, a cluster of very small short stalked fronds were forming, differing altogether from the normal ones in being very thin and translucent, with veins of a much more indefinite character, and in addition to the very short stalks (the normals have very long ones) they were only pinnatifid, i.e. scarcely once divided, each frond of the half-dozen being of the same size (about half an inch long), only with two or three blunt lobes on each side. They thus presented no resemblance whatever to the accompanying normals, which are tripinnate; and had it not been perfectly clear that they sprang from the rootstock direct, I should have taken them for another fern entirely, though they resembled none known to me. Their peculiar thinness and translucency led me, in view of my experience with aposporous ferns,

to sever one and layer it in sterilised loam to see what it would do. Early in September the normal fronds followed their usual habit of dying down, but those of the little cluster remained green and vigorous. The layered one did the same, and in October, on examining it with a lens, I found two excrescences had appeared near the tips of two of the side divisions, and these eventually asserted themselves as bulbils. I then layered another in the same way, and this remained perfectly green through the winter, as did those left untouched, but showed no signs of growth until April of this year, when the central cells began to develop, and at the moment of writing (May 22) have produced spherical excrescences which are obviously incipient bulbils. The frondlet first layered has now turned black, but the bulbils have produced one frond and two fronds respectively of the normal seedling type, and the plants are practically established. During the winter the axis of growth whence the original cluster of frondlets sprang developed several incipient fronds, which, when the growing season came, grew up into quite normal *C. montana* fronds, a remaining abnormal frondlet still persisting at their base. One had been eaten by insects and the other removed for layering or microscopic examination. By the latter it is seen that these frondlets are only one cell thick; and Professor Farmer, who has kindly examined them, remarks that, although abnormal in this respect, the outline of the cells is normal, and not of that modified type common to aposporous cellular tissues. In any case, however, we have here the unique fact of a normal fern producing two distinct kinds of fronds—the one of normal long-stalked decomposite structure and cellular formation and perfectly deciduous, growing, moreover, in succession from a creeping rootstock, and the other of a very simple short-stalked type of abnormal cellular thinness, persistently evergreen, produced in a circle round a central axis, and, moreover, endowed with a proliferous character of a very peculiar type. Whether this phenomenon was induced by the check to growth caused by the disturbance incidental to the two successive shifts above cited is an open question. If it were, the case becomes an extremely curious example of an adoption, as it were, of modified proliferous structures to increase the chance of survival. The crowns of many ferns, if crushed or mutilated, are capable of developing bulbils in self-preservation; but so far as records go these are always normal bulbils, induced buds, and are never arrived at indirectly as in this case, through specially modified preliminary outgrowths differing in all respects from the normal specific characters of form, cellular construction, and, above all, deciduousness or otherwise.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 8, 1905.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H. (President of the Society),
in the Chair.

Fellows elected (42).—John Bannerman, Elliot F. Barker, Rev. A. H. Sansay Barwell, Miss M. E. Boucher, Mrs. Bruce, C. H. Buck, Ralph Callard, Lawrence E. Churchill, Rev. Alfred Clemenson, A. F. Baker-Cresswell, Rev. J. M. Dudgeon, Mrs. George Edgelow, Mrs. Fairclough, Miss V. B. Fellowes, Rev. Theodore N. Flintoff, The Rev. Canon Fowler, Mrs. J. Leigh Fremlin, R. Ward Gleadow, Percy N. Graham, Lieut.-Col. G. R. Hadaway, Mrs. J. Crichton Haines, Mrs. Hansard, Mrs. R. Hill, Isidore R. Horton, Major John Howard, Col. Hon. H. Legge, J. B. Leigh, W. J. Herries-Maxwell, Joseph Muller, Mrs. A. J. Norris, H. W. Palmer, Mrs. H. G. Pearson, Chas. A. Piper, Mrs. E. Reuter, Mrs. Rowcliffe, Paul Stickland, Major J. G. Thorold, Charles C. Wall, Cecil A. Webb, Mrs. L. F. Webb, Miss E. F. Willans, James E. Woods.

Fellow resident abroad (1).—Maynard Nash (Cape Town).

Associates (2).—Miss D. B. Allwork, S. W. Whalley.

Society affiliated (1).—Ashford Horticultural Society.

GENERAL MEETING.

JANUARY 24, 1905.

Mr. JAMES L. WOOD, F.R.H.S., in the Chair.

Fellows elected (67).—Mrs. E. C. Adams, William Attlee, Frederic Bonney, Mrs. Percy Boulton, Mrs. H. R. Boyce, Robert Broome, James T. Brownlow, Walter Burbridge, Mrs. Henry Caldwell, Admiral Henry J. Carr, Miss Olive Church, W. H. Clarke, Mrs. Cooper, Albert S. Corbett, Mrs. Armar Corry, Leonard Cutbush, Mrs. Frank Day, William R. Deakin, A. W. Edwards, Mrs. King Farlow, J. A. Ford, Ernest J. Fry, Percy Gee, G. Gilbert, Mrs. H. J. Greenhill, J. W. Guy, Mrs. Halsey, Mrs. G. Hanbury, N. A. Heywood, F. Jones, Montagu G. Knight, Guy W. S. Law, F. Link, Sir George S. Mackenzie, Mrs. A. MacNab, Mrs. MacRae, Miss M. Mann, A. McL. Marshall, E. W. Martin, Mrs. E. W. Martin, Robert F. Mills, Miss Moorhouse, G. E. Parr, Francis J. Pearse, Mrs. L. Penny, Hon. Mrs. Chambré Ponsonby, Countess of

Portarlington, Hon. Hy. Portman, Capt. R. Purefoy, Herbert Reeves, Miss M. H. Rehder, Wm. J. P. Robinson, Miss M. Sandbach, Dr. C. Stirling Saunder, Mrs. S. A. Shepherd, Mrs. Morton Smale, John T. Swarder, Dr. R. Stanley Thomas, Lady Vaux of Harrowden, Mrs. W. H. Weatherley, W. J. Wigston, H. Leader Williams, Miss S. G. Wingfield, Mrs. Wingfield, Miss M. S. Yates, L. Duchesne (Brussels).

Associate (1).—David Bowen.

Society affiliated (1).—Isle of Wight Horticultural Society.

A paper on "The German Methods of Fruit Preserving" was read by the Assistant Secretary (see vol. xxix. p. 560).

ANNUAL GENERAL MEETING.

FEBRUARY 14, 1905.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H. (President of the Society), in the Chair.

The Minutes of the last Annual Meeting were read and signed.

Fellows elected (89).—G. Adams, Mrs. Pulham Aldrich, Edmund A. Beevers, Ernest Bent, A. Brakspear, Mrs. Briggs, H. B. Browning, Mrs. F. Buckland, Miss L. Bullen, Miss E. S. Bullock, Edward T. Burr, Arthur Cane, Arthur Cartmell, Miss Christie-Miller, Felix T. Cobbold, F. J. Cocks, Mrs. H. K. Colville, Mrs. C. A. V. Conybeare, Mrs. Radcliffe Crocker, J. W. Cross, Miss A. Hart Dyke, Mrs. Eardley-Wilmot, Mrs. W. Ellice, Miss Ellis, Miss E. Endicott, M. H. Orr Ewing, Mrs. Willis Fleming, J. Rawlinson Ford, Miss Lucy Gairdner, James Gibson, Herbert F. Goodson, Henry J. Goodson, Lester Gower, Leonard Graves, Mrs. J. H. Gregory, T. R. Grey, E. C. Hannen, Mrs. Haselfoot, C. J. Hegan, Mrs. Heinemann, Mrs. W. H. Hillyer, Reginald T. Howard, Mrs. W. Howard, C. F. Jones, Miss Keen, Mrs. Kemp, William Kidd, Major H. C. Lambert, R. T. MacDougall, Mrs. Mackintosh, Mrs. Marchant, F. Merritt, C. Mitchell, Mrs. R. Newton, Mrs. J. W. Parriss, C. R. S. Payne, H. J. Pewtress, Mrs. Laurence Phillips, Ernest Poupart, Mrs. E. Power, Miss Puckle, T. Roberts, Mrs. T. W. U. Robinson, Mrs. G. W. Rundall, Mrs. C. E. Schwann, Miss C. E. Secretan, Mrs. Shorter, Herbert F. Smith, Mrs. Spilling, Lady Sutton, Miss Talbot, Mrs. Thornett, Miss Tinne, Mrs. H. S. Todd, Gen. W. P. Tomkins, C.I.E., — Venning, R. Venning, A. Walsh, Mrs. R. H. Warren, Mrs. E. M. Watson-Kennedy, Mrs. Henry Wharton, James Whilesmith, H. Renton Whitelaw, J. Wiener, Mrs. Douglas Wilson, A. Wilson, W. D. Wiltshire, Ernest Wolfgang, G. Wood.

Associates (6).—Miss L. Attneave, J. Blackmore, Miss M. Kipping, Miss M. W. Unwin, Miss G. Von Sanden, William Wright.

Societies affiliated (4).—Chapel Street P.S.A. Floral Horticultural Society, Tunbridge Wells Chrysanthemum Gardening Mutual Improvement Association, Wanstead and Leytonstone Horticultural Society, Watford and District Horticultural Mutual Improvement Society.

The President moved the Adoption of the Report, given on page iii, which was seconded by Mr. Arthur W. Sutton, V.M.H., and, after a few remarks by Mr. H. J. Elwes, V.M.H., was carried unanimously.

The Secretary read the names of Vice-Presidents and Officers proposed for election, and the President declared them all duly elected, no other names having been proposed.

Sir John Llewelyn moved the following resolution: "That on the occasion of holding the first Annual Meeting in their new hall, the Fellows of the Society, whilst congratulating themselves on the possession of such a magnificent hall and offices, wish to express their great indebtedness to all who have so generously come forward to provide the necessary funds for the building, and therein especially to Baron Schröder, without whose constant aid and advice the undertaking could not possibly have been carried to such a successful issue."

This was seconded by Mr. Druery, V.M.H., and carried unanimously.

A vote of thanks to the President, moved by Captain George Holford, C.I.E., C.V.O., closed the meeting.

REPORT OF THE COUNCIL

FOR THE YEAR 1904.

1. The One-Hundred-and-First Year.—The celebration of the Centenary of the Society, the opening of the Hall and Offices by His Majesty the King, and the removal of the Gardens from Chiswick to Wisley, must make 1904 ever memorable in the History of the Royal Horticultural Society. The Council are exceedingly gratified to record the successful accomplishment of each of these important events in the Society's history.

2. The Royal Horticultural Hall.—It is in great measure due to the perseverance and generosity of Baron Sir Henry Schröder, V.M.H., that the Society is now in possession of a magnificent Hall and Offices of its own, though the kindness and liberality of other Fellows in supporting his efforts must by no means be lost sight of. The Society is under a great obligation to the Baron, and to all others who have assisted in providing the Society with such excellent buildings.

3. Opening of the Hall.—The Hall was graciously opened by His Majesty the King on Friday, July 22, 1904, accompanied by Her Majesty the Queen and H.R.H. the Princess Victoria, and the first meeting and show took place four days later, since which time the shows have increased both in extent and importance, owing, no doubt, to the magnificent building, with its far better light and increased facilities for the display of every form of Horticultural produce.

4. Deficiency on the Hall Fund.—While the Council congratulate the Fellows on the raising of so large a sum as £25,178 towards the building of the Hall, they cannot but look upon it as a misfortune that there still remains a debt on the Building Fund of £8,989. The Council make an earnest appeal to the Fellows to help in paying off this debt, and invite every Fellow to send a contribution at once for this purpose, so that in the new Century of the Society's existence it may not be hampered by a heavy deficiency.

5. Letting of the Hall.—The Hall, in addition to its being the lightest in London, possesses splendid acoustic properties, and is being eagerly inquired after for Concerts, Bazaars, Shows and other functions; and the Council trust that when the building becomes thoroughly known, the rents receivable from such lettings will materially help towards meeting the heavy cost for ground-rent, rates and taxes, &c., and general maintenance, all of which would otherwise fall on the Society's annual income.

6. Wisley Gardens.—The new Gardens at Wisley so generously purchased for the Society's use by Sir Thomas Hanbury, V.M.H., have received much attention. A large range of glass houses has been erected; a new house for the Superintendent and a cottage for the Fruit Foreman have also been built, and extensive water and sewage works have been carried out. Seven acres have been planted with a representative collection of Fruit trees and bushes kindly presented to the Society by Messrs. G. Bunyard & Co., Ltd., Dickson's, Ltd., John Fraser, H. Lane & Son, Hugh Low & Co., Paul & Son, J. R. Pearson & Sons, Thos. Rivers & Son, W. Spooner & Sons, and J. Veitch & Sons, Ltd.

7. Laboratory for Experimental Research.—The Council are most anxious to be able to erect suitable buildings at Wisley to serve as a Laboratory for Scientific and Experimental Research in matters pertaining to Plant life, diseases and pests, but they cannot consent to expenditure in this direction in the present financial position of the Society.

8. The Council.—In the spring of the year, to the regret of his colleagues, the Rt. Hon. the Lord Redesdale felt obliged to tender his resignation of his seat on the Council on account of absence abroad.

9. Death of Mr. Lloyd.—Later in the year a great loss was sustained through the sudden death of Mr. Frederick G. Lloyd, who was elected to a seat on the Council on December 18, 1898. During the 5½ years he has thus been connected with the administration of the Society Mr. Lloyd devoted himself to its welfare and progress, and his death is deeply deplored by all his colleagues.

10. New Members of Council.—Acting in accordance with Bye-Laws Nos. 61 and 62, the Council elected Mr. W. A. Bilney and Sir Albert Rollit, M.P., to fill the vacancies thus caused in their body.

11. Retiring Members of Council.—Under Bye-Law 60 the three members of Council who have been longest in office retire every year, but are eligible for re-election. The three thus retiring this year are Mr. Alfred H. Pearson, Mr. Geo. Bunyard, and Sir Albert Rollit, M.P. (who in this matter represents the late Mr. F. G. Lloyd). These three gentlemen have been nominated for re-election. The following have been nominated as VICE-PRESIDENTS, viz.:—

The Right Hon. Joseph Chamberlain, M.P.
 The Right Hon. the Earl of Ducie.
 The Right Hon. Lord Rothschild.

Sir Frederick Wigan, Bart.

Sir John T. Dillwyn-Llewelyn, Bart.

The following have been nominated as OFFICERS :—

Sir Trevor Lawrence, Bart., V.M.H., *President*.

Mr. J. Gurney Fowler, *Treasurer*.

Rev. W. Wilks, M.A., *Secretary*.

Mr. Alfred C. Harper, *Auditor*.

No other names having been proposed, there is consequently no need to issue a balloting list.

12. Deputations, &c.—Early in the year the Council were invited to nominate two representatives to sit on the Board of Examiners appointed by the University of Oxford in connection with the Horticultural Department of Reading College. The Council were fortunate in obtaining the consent of the Rt. Hon. the Earl of Ilchester and Mr. Arthur W. Sutton, V.M.H., to act as the Society's representatives. On February 16, 1904, the Royal Scottish Arboricultural Society celebrated their Jubilee, and the Society was represented on that occasion by Mr. A. D. Webster, F.R.H.S. The Royal Caledonian Horticultural Society will be celebrating their centenary in the forthcoming year, and the Council have accepted an invitation to send a deputation to Edinburgh for the great show on September 12. The Council have accepted another invitation to send a deputation to Paris in connection with the International Horticultural Exhibition to be held there in May 1905.

13. Victoria Medal of Honour.—The Council regret to have to record the death of the following holders of the Victoria Medal of Honour in Horticulture (V.M.H.) during the past year, viz.:—The Very Rev. S. Reynolds Hole, D.D., Dean of Rochester, the Rev. C. Wolley Dod, M.A., and Mr. Hermann Herbst. There being also a vacancy left over from 1903, caused by the death of Mr. James Smith, of Mentmore, the Council, in order to complete the full number (63) of the holders of this medal, have appointed the following gentlemen to this distinction in recognition of their great services to Horticulture :—The Rt. Hon. the Lord Redesdale, Mr. Thomas Challis, Mr. Alexander Dean, and Mr. Edward Mawley.

14. Deceased Fellows.—Among the other Fellows whose loss since January 1, 1904, the Council have to regret are H.R.H. the Duke of Cambridge, K.G., Major-General Abbott-Anderson, The Lord Alington, Rev. John Climenson, Hon. Francis C. Drummond, Rev. Andrew Foster-Melliar, The Viscountess Glentworth, Professor Carl Hansen (Copenhagen), Rt. Hon. Sir William Vernon Harcourt, The Lord Harlech, Col. Lawrence Heyworth, Hon. E. H. Johnstone, Hon. Mrs. Edward Kenyon, Robert McLachlan, F.R.S., Frank Adolf Rehder, Hon. P. L. C. Shepherd (Sydney, N.S.W.), The Earl of Strathmore, The Lady Tweedmouth, Hon. Mr. Justice Wright, The Lord Wynford, Col. C. Wynne-Finch, and Hon. Mrs. Yorke.

15. Annual Progress.—The following table will show the Society's progress in regard to numerical strength during the past year :—

LOSS BY DEATH IN 1904.				FELLOWS ELECTED IN 1904.			
		£	s. d.			£	s. d.
Life Fellows	27	0	0 0	4 Guineas	15	63	0 0
4 Guineas	1	4	4 0	2 "	547	1,148	14 0
2 "	27	56	14 0	1 "	748	785	8 0
1 "	49	51	9 0	Associates	27	14	3 6
	104	£112	7 0	Affiliated Societies	29	31	10 0
				Commutations	17		
				= £430 10s. 0d.			
LOSS BY RESIGNATION &c.					1,383	£2,042	15 6
		£	s. d.		Deduct Loss	531	16 6
2 Guineas	41	86	2 0	NET INCREASE IN INCOME			
1 "	299	313	19 0			£1,510	19 0
Associates	13	6	16 6	New Fellows &c.		1,383	
Affiliated Societies	12	12	12 0	Deduct Resignations and Deaths		469	
	365	£419	9 6	NUMERICAL INCREASE			
TOTAL LOSS	469	£531	16 6			914	

The total number of Fellows, Members, Associates, and Affiliated Societies is now 8,360

16. The Journal.—The JOURNAL still continues to be highly valued by the Fellows. During the past year Parts 3 and 4 of Vol. xxviii. have been issued, and before this Report is sent out it is hoped that Parts 1 and 2 and a portion of Part 3 of Vol. xxix. will have been published and issued to the Fellows. The publication of Vol. xxix. has been purposely delayed in order to assist the finance of the Society, which has this year needed great care and management, but the JOURNAL has only been delayed a couple of months at the most. The Council take this opportunity of again thanking the writers of papers and the compilers of Abstracts for their generous and ready assistance in thus enabling the Society's JOURNAL to take a foremost place among the publications of the Scientific Societies of Europe.

17. The Library.—The room in which the Library will in future be housed has been admirably furnished and fitted, through the liberality of Baron Schröder, who, besides his original subscription of £5,000 to the Hall, has most generously defrayed the whole cost of moving the Library and housing it worthily. The heating and the lighting, both by day and by night, are excellent, and as the accommodation is now double what it was in Victoria Street, donations of suitable books will be most gladly welcomed.

18. Examinations.—The Society's Twelfth Annual Examination in the Principles and Practice of Horticulture, for which 190 entries were received, was held at sixty-six local centres on Wednesday, April 20, 1904. In view of the increasing demand in country districts that the Schoolmasters should be competent to teach the elements of Cottage Gardening, and the absence hitherto of any test whatever of such competence, the Society also held on Tuesday, June 21, an Examination for Elementary and Technical School Teachers only, for which 124 entries were received. The results of these Examinations will be found in the JOURNAL (Vol. xxix., pages 161, 166). These Examinations will be repeated in 1905, on April 12 and April 5 respectively.

19. Information.—The Council note with much satisfaction that the number of Fellows seeking information from the Society's Officers is rapidly increasing, and some thousands of answers have been given to inquiries of every description. They would remind Fellows that the Officers and the Scientific Committee are always ready to afford every assistance in their power to Fellows as to the identification of plants and fruits, and on doubtful matters of practice and on other similar questions.

20. Committees.—The Council again point out to the Fellows the great obligation the Society is under to the members of the standing Committees for their prolonged labours for the benefit of the Society and of the science it represents. They would also take this opportunity of expressing publicly the special thanks of the community to the Rev. Professor Henslow, V.M.H., for his unremitting labours as Secretary of the Scientific Committee since 1880, which he is now, amid the universal regret of his colleagues, relinquishing on account of his change of residence.

21. Awards.—The number of awards granted by the Council, on the recommendation of the various Committees, will be seen from the following table :—

Awards	On Recommendation of										Total
	Purchased by Affiliated Societies	Temple Show	Holland House Show	Autumn Rose Show	Fruit Show	Show of Colonial- grown Fruits & of Preserved Fruits	Fruit Committee	Floral Committee	Orchid Committee	Narcissus Committee	
Gold Medal ...	—	9	7	—	2	4	3	3	8	1	37
Silver Cup ...	—	27	22	—	—	—	—	—	—	1	50
Silver-gilt Hogg Medal	—	—	—	—	3	—	1	—	—	—	4
Silver-gilt Lindley Medal	—	1	—	—	—	—	—	—	—	—	1
Silver-gilt Flora ...	—	15	13	3	—	—	—	26	16	1	74
Silver-gilt Knightian ...	—	1	—	—	1	4	9	—	—	—	15
Silver-gilt Banksian ...	—	11	4	5	—	2	1	25	—	1	49
Silver Hogg ...	—	—	—	—	1	—	2	—	—	—	3
Silver Lindley ...	—	—	—	—	—	—	—	—	1	—	1
Silver Flora ...	—	18	12	7	—	—	—	80	49	9	175
Silver Knightian ...	—	2	—	—	1	1	14	—	—	—	18
Silver Banksian ...	9	16	15	4	1	1	15	86	42	7	196
Bronze Flora ...	—	—	—	1	—	—	—	19	—	—	20
Bronze Knightian ...	—	—	—	—	—	—	1	—	—	—	1
Bronze Banksian ...	7	—	1	—	—	1	1	9	—	—	19
Silver Gilt...)	20	—	—	—	—	—	—	—	—	—	20
Silver ...)	44	—	—	—	—	—	—	—	—	—	44
Bronze ...)	49	—	—	—	—	—	—	—	—	—	49
First-class Certificate ...	—	3	4	—	—	—	1	17	30	3	58
Award of Merit... ...	—	16	13	—	—	—	18	128	63	25	263
Botanical Certificate ...	—	—	2	—	—	—	—	2	20	—	24
Cultural Commendation	—	2	—	—	—	—	25	5	18	3	48
Total ...	129	121	93	20	9	13	91	400	242	51	1169

In addition to the above a Silver-gilt Flora Medal was awarded to Miss F. M. Verrall for having passed first in the Society's Examination in Horticulture, held on April 20, and a similar medal was awarded to Mr. Montagu W. Dance for having passed first in the Examination in Cottage

and Allotment Gardening on June 21. One hundred and twenty-nine Bronze Banksian Medals have also been granted to Cottagers' Societies.

22. Duration of Shows.—The shows during the past year have numbered 25, occupying 81 days in all; and already 26 have been arranged for 1905, lasting over 82 days, which programme will possibly be increased before the close of the year. It has been decided to keep open the Hall Shows till 6 p.m. throughout the year, except in January, February, November, and December, when they will close at 5 p.m.

23. Fruit and Vegetable Shows.—The Eleventh Annual Show of British Grown Fruit was held for the first time in London, on October 4, 5, and 6, in the new Hall, and was in every way a success. The quality of the fruit was excellent, and the colour has probably never been equalled. In 1905 the Show will again be held in the Hall on October 10, 11, and 12. There will also be a Show of home-grown Vegetables on Tuesday, October 24.

24. Colonial and Preserved Fruit Shows.—On December 13 and 14 the first Show of colonial-grown fruits, and of home, colonial, and foreign preserved and bottled fruits and jams, was also held in the new Hall. Another Show of colonial-grown fruits and vegetables, both fresh and preserved, has been arranged for Thursday and Friday, March 30 and 31, 1905. The Council trust that by means of these Exhibitions the Fellows and others may become more fully acquainted with the horticultural products of the Empire.

25. Special Flower Shows.—On September 20 the Society held, in conjunction with the National Rose Society, a Show of Autumn Roses, of which a most beautiful display was made, the Great Hall being filled from end to end. Next year this show will last over two days, viz. September 26 and 27, 1905. The National Auricula and Primula, the National Tulip, and the National Carnation and Picotee Societies also held their shows in connection with the Royal Horticultural Society's fortnightly meetings, and these, together with the National Sweet Pea Society, have all arranged to hold similar shows in connection with Meetings of the Society in 1905.

26. Kindred Societies.—Besides welcoming kindred Societies and encouraging them to hold their shows in connection with the Society's fortnightly meetings, the Council have also agreed to allow them the use of the Hall for independent shows at specially low rates, and some of these Societies have arranged to hold their regular Council, Committee, and other meetings in the rooms attached to the Hall, which it is hoped will thus, in time, become the centre of unity for the horticulture of the Empire.

27. Temple Shows.—The Society were again kindly permitted by the Master and Benchers to hold their Spring Flower Show in the gardens of the Inner Temple, on May 31 and June 1 and 2. The Show was honoured by a visit from their Majesties the King and Queen, and proved to be one of the very best ever held by the Society. Arrangements have been made for the holding of this show for the eighteenth year in succession on May 30 and 31 and on June 1 next.

28. Summer Shows.—By the kindness and courtesy of the Earl and Countess of Ilchester, a great Summer Show was held for the third time in the Park of Holland House, Kensington, on July 12 and 13 last. As, however, it has not been found possible to again hold this show on this site in 1905, the Council are endeavouring to find some other suitable place, which will be announced in due course. The Council feel that the Society is under the deepest obligation to Lord and Lady Ilchester for the use of their park for three years in succession.

29. Lectures in 1904.—The following gentlemen have delivered Lectures before the Society during the past year, and the Council would take this opportunity of thanking them for thus contributing towards the success of the fortnightly meetings :—

- Jan. 26.—Mr. H. Somers Rivers, on Oranges.
- Feb. 23.—Mr. R. Lewis Castle, on Pomology as a Study.
- Mar. 8.—Mr. Alex. Dean, V.M.H., on Cottage and Allotment Gardens.
- „ 22.—The Rev. Prof. Geo. Henslow, V.M.H., on Heredity of Acquired Characters.
- April 5.—Mr. Hugh P. C. Maule, on Design in the Suburban Garden.
- „ 19.—Mr. Geo. Massee, V.M.H., on Potato Diseases.
- May 8.—Monsieur Charles Baltet, on Enemies of the Apple Tree.
- „ 17.—Mr. R. Hedger Wallace, on the Horticultural Phase of Natural Study.
- June 14.—The Rev. Prof. Geo. Henslow, V.M.H., on Floral Metamorphoses.
- „ 28.—Monsieur Viviani Morel, on Hybridisation of Roses.
- * July 26.—Mr. John Bidgood, B.Sc., on Orchid Varieties and Hybrids.
- Aug. 9.—Prof. Boulger, on the Preservation of Wild Flowers.
- * Sept. 6.—Mr. J. W. Odell, on Gourds.
- * „ 20.—Mr. George Gordon, V.M.H., on Ways of Employing Roses in Garden Decoration.
- * Oct. 18.—The Rev. Prof. Henslow, V.M.H., on Geographical Botany as the Result of Adaptation.
- Nov. 1.—The Hon. Vicary Gibbs, on Planting for Winter Effects.
- Dec. 13.—Mr. W. G. Freeman, B.Sc., on the Fruits of the West Indies.

* Lecture Illustrated by Lantern Slides.

30. Work in the Gardens.—The Council would again draw the attention of the Fellows to the excellent work which has been carried on at Chiswick for nine years past by the Superintendent, Mr. S. T. Wright, among the students under instruction there. During these years three of our students have taken a first-class in advanced Botany; one a first-class in Science and Art; one a first in Agricultural and Rural Economy; two a first in Elementary Botany; two a second-class in advanced Botany; one is a Curator of Botanic Gardens abroad; one is engaged in valuable scientific work; one has been appointed to conduct an important series

Dr.

ROYAL HORTICULTURAL

ANNUAL REVENUE AND EXPENDITURE

	£ s. d.	£ s. d.
To ESTABLISHMENT EXPENSES—		
Salaries and Wages	1,100 10 6	
Rent of Office	203 3 0	
Printing and Stationery	619 8 5	
JOURNAL—Printing and Postage	1,237 6 5	
Postages	341 5 10	
Fuel and Gas	24 14 6	
Donation to Primula and Auricula Society ...	10 0 0	
" Carnation Society	10 0 0	
Commission on Advertisements, JOURNALS, &c.	48 10 0	
Painting Orchid Pictures	15 0 9	
Water Rate	31 0 0	
Electric Lighting	55 6 5	
Ground Rent	172 10 0	
Rates and Taxes	133 3 0	
Interest	19 9 4	
Miscellaneous	242 7 7	
		4,263 15 9
„ DILAPIDATIONS (Victoria Street Offices) ...		50 0 0
„ LINDLEY LIBRARY		19 1 6
„ SHOWS and MEETINGS—		
Rent of Drill Hall and Cleaning	69 15 0	
Temple Show	773 0 6	
Holland Park Show	686 10 11	
Fruit Shows	327 3 4	
Labour	106 3 1	
Expenses of Floral Meetings and Conferences	66 9 0	
		2,029 1 10
„ PRIZES and MEDALS—		
Committee Awards &c.		550 3 11
„ CHISWICK GARDENS—		
Rent, Rates, Taxes, and Insurance	187 0 4	
Superintendent's Salary	112 10 0	
Labour	135 19 4	
Plant Distribution	69 8 4	
Coal and Coke	47 12 9	
Water and Gas	9 9 3	
Miscellaneous Expenses	116 19 11	
		678 19 11
„ WISLEY GARDENS—		
Rates and Taxes	22 17 11	
Superintendent's Salary	112 10 0	
Labour	654 1 6	
Garden Implements, Manures, &c.	40 5 11	
Repairs	51 10 9	
Fuel	35 5 6	
Miscellaneous Expenses	281 6 1	
		1,197 17 8
		8,789 0 7
„ BALANCE, carried to Balance Sheet		5,235 8 1
		£14,024 8 8

TURAL SOCIETY.

ACCOUNT for YEAR ending DECEMBER 31, 1904.

Cr.

	£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS				9,800	19	8
„ SHOWS and MEETINGS—						
Temple Show	1,460	19	3			
Holland Park Show	627	8	6			
Fruit Show	221	16	9			
Admissions to Hall	178	18	0			
				2,489	2	6
„ ADVERTISEMENTS IN "JOURNAL"	499	13	11			
„ SALE OF "JOURNALS"	83	15	4			
„ MISCELLANEOUS RECEIPTS	15	4	0			
				598	13	3
„ DIVIDENDS—						
Davis' Bequest	48	5	0			
Consols	203	4	6			
Local Loans	165	9	8			
Rupee Paper	79	16	3			
				496	15	5
„ INTEREST ON DEPOSIT ACCOUNT				79	13	11
„ PRIZES and MEDALS				82	9	1
„ EXAMINATIONS in HORTICULTURE —						
Amount received in Fees	85	6	0			
Less expended	39	0	0			
				46	6	0
„ LIFE COMPOSITIONS --						
Being Amount paid by Fellows now deceased				157	10	0
„ CHISWICK and WISLEY GARDENS—						
Produce sold	46	8	6			
Sale of Plants, &c.	92	17	11			
Students' Fees	15	15	0			
Inspection of Gardens	55	19	11			
Miscellaneous Receipts	52	7	6			
				263	8	10
„ RENT OF HALL	11	5	0			
Less expenses	1	15	0			
				9	10	0

£14,024 8 8

ALFRED C. HARPER, F.C.A., Auditor (HARPER BROTHERS),
Chartered Accountant, 10 Trinity Square, E.C.

ROYAL HORTICULTURAL

Dr.

BALANCE SHEET.

	£	s.	d.	£	s.	d.
To SUNDRY CREDITORS—						
Chiswick and Wisley	79	1	4			
Establishment	478	11	10			
Painting Orchids Certificated	26	16	0			
				584	9	2
„ LOAN FROM BANK				6,500	0	0
„ SUBSCRIPTIONS, 1905, paid in Advance	288	4	6			
„ ADVERTISEMENTS, 1905, paid in Advance	4	15	6			
				293	0	0
„ LIFE COMPOSITIONS, Dec. 31, 1903	2,370	15	6			
Do. do. do. 1904	542	2	0			
	2,812	17	6			
Less Fees paid by Fellows, now deceased	157	10	0			
				2,655	7	6
„ ENTRANCE FEES				426	6	0
„ DONATIONS, Wisley				34	19	6
<i>Sale of Chiswick Lease not yet received, £4,770.</i>						
„ RECEIPTS ON BEHALF OF THE NEW HALL BUILDING FUND—						
Donations	24,477	3	9			
Sundry other Receipts	701	4	11			
				25,178	8	8
„ GENERAL REVENUE ACCOUNT—						
Balance, January 1, 1904	17,596	16	8			
Less Bad Debts	7	19	6			
	17,588	17	2			
Balance for the Year 1904, as per Annual Revenue and Expenditure Account	5,235	8	1			
				22,824	5	3

£58,496 16 1

TURAL SOCIETY.

DECEMBER 31, 1904.

Cr.

	£	s.	d.	£	s.	d.
By EXPENDITURE ON THE NEW HALL AND						
OFFICES TO DATE				34,166	10	6
<i>Estimated Amount outstanding, still to be paid, £4,375 18s.</i>						
„ EXPENDITURE—FURNISHING THE HALL						
AND OFFICES				382	16	4
<i>Estimated Amount outstanding, still to be paid, £649 10s. 8d.</i>						
„ DWELLING HOUSES, WISLEY				1,690	0	0
<i>Approximate Amount still owing for Completion, £452 14s. 6d.</i>						
„ GLASS HOUSES, HEATING APPARATUS AND						
FITTINGS, WISLEY				2,932	17	8
<i>Approximate Amount still owing for Completion, £385 4s. 4d.</i>						
„ MATERIALS AND APPLIANCES FOR SHOWS				236	11	0
„ SUNDRY DEBTORS—						
Annual Subscriptions outstanding, estimated						
at	5	5	0			
Garden Produce	7	11	4			
Advertisements	111	9	4			
Rates and Taxes (Wisley) paid in advance ...	4	17	0			
Interest on Investments	143	19	9			
				273	2	5
„ CHISWICK SCHOLARSHIPS—						
Amount Expended	104	3	4			
„ Received	72	18	4			
				31	5	0
„ INVESTMENTS—						
2½ % Consols £2,122 8s. 9d. cost	1,892	11	3			
(£2,022 8s. 9d. of this sum is held by the Society, subject to the provisions of the will of the late J. Davis, Esq.)						
2½ % Consols, £8,310 13s. 9d. cost	8,067	13	6			
3 % Local Loan, £5,800 „	6,006	16	6			
37,000 Rupees, Indian Rupee Paper „	2,462	14	4			
				18,429	15	7
„ CASH AT LONDON AND COUNTY BANK ...	343	5	1			
„ PETTY CASH (Establishment)	9	9	7			
„ Do. (Wisley)	1	2	11			
				353	17	7
				<u>£58,496</u>	<u>16</u>	<u>1</u>

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on December 31, 1904.

ALFRED C. HARPER, F.C.A., Auditor (HARPER BROTHERS),
Chartered Accountant, 10 Trinity Square, E.C.

of experiments with land and crops ; fifteen have taken a first-class in the R.H.S. Examination in Horticulture ; three are on the editorial staff of Horticultural papers ; two are on the staff at Horticultural Colleges ; one is at a School of Forestry ; one is a Horticultural Instructor ; nineteen are in business for themselves ; four are fruit growing and farming in Canada ; one is fruit growing and farming in Ireland ; one is in India tea planting ; two are engaged in business in the United States ; two are in business on the Continent ; two are employed in Botanical Gardens ; two are engaged in well-known nurseries ; and two are gaining further experience in market gardens. More than 90 per cent. of the students are doing well. The Council are quite unable to meet the demand for energetic, trustworthy young men, but they *must all be workers*. During the past year applications were received for thirty-six head gardeners ; three single-handed gardeners, ten foremen, eleven journeymen, three foresters, and several miscellaneous men, such as nursery foremen, landscape gardeners, propagators, &c. In the great majority of cases the applicants were supplied with men.

81. Students at Wisley.—This good work is being continued at Wisley. Students are admitted for a period of two years, and are trained in practical horticulture. Some of them also attend the Society's lectures and shows in the new Hall and elsewhere. A small horticultural library is attached to the Gardens for their use. Every opportunity is given, to students who use application, to master the whole of the general subject of practical horticulture, and as soon as a scientific department can be established elementary science as it affects horticulture will be added to the curriculum.

82. Trials in 1905.—During the forthcoming year trials will be carried out at Wisley with potatoes, peas, broccoli, and tomatoes amongst vegetables, and with violas, sweet peas, carnations, and cactus dahlias amongst flowers. It is also proposed to plant portions of the land at present unoccupied with a representative collection of trees and shrubs, and with the best varieties of every description of rose. The large span of glass and the increased area of ground afford far greater facilities than ever before. Donations of trees, shrubs, hardy alpine and other plants, seeds and cuttings would prove most acceptable.

88. Distribution of Plants.—About 60,000 plants, cuttings, and packets of seeds were distributed from Chiswick last spring, and a similar distribution by ballot will take place during March and April, but Fellows are requested to bear in mind that the Superintendent and his staff have been barely six months at Wisley, so that the stock of plants is not so large as heretofore, and as it is confidently hoped it will be in year or two's time.

34. Conclusion.—Whilst fully recognising that the present satisfactory condition of the Society's affairs is largely due to the generosity and kindly assistance of the Fellows, the Council would urge them not to relax their exertions, but rather to make a renewed effort to wipe off the debt still remaining on the Hall, to complete the equipment of Wisley by the erection of a Horticultural Research Station, and to increase the

Roll of Fellows to ten thousand by the end of the hundred-and-first year of the Society, which closes on March 6, 1905.

By order of the Council,

W. WILKS, *Secretary*.

GENERAL MEETING.

FEBRUARY 28, 1905.

Sir ALBERT K. ROLLIT, M.P., in the Chair.

Fellows elected (61).—Ronald Adams, Miss E. G. Anson, Archdeacon Atlay, Mrs. Baker, Lady Barlow, Mrs. Beck, W. B. Beckett, Mrs. Beckwith, James M. Binnie, H. Brownhill, Mrs. Buntine, Mrs. E. A. Capon, G. Comber, Rev. W. E. Dalton, A. N. Dickson, Mrs. F. B. Eastwood, Robert H. Fowler, T. Mackenzie Fowler, Mrs. Walter Game, Mrs. Alfred Gilbey, T. H. Gould, Mrs. Gouldsmith, Dr. Thomas Harris, W. Hasler, Miss G. Hatfield, Mrs. Hugh Hole, Mrs. Larcom, Miss B. Lloyd, Mrs. J. Lyon, W. MacGregor, E. Matthews, Major E. Milner, Mrs. Musson, Mrs. D. Neufville, T. F. N. Newman, Mrs. W. G. Nicholson, Miss M. M. Norton, W. C. Parkes, Robert Parry, Henry Perrin, Miss Perry, Thomas H. Phillips, Mrs. Wellesley Piggott, W. R. Pooley, Mrs. C. Potter, Joseph W. Ranstead, W. F. Rawnsley, R. H. Rothwell, Duchess of Roxburghe, C. B. Sharpe, Miss Shiffner, Mrs. G. N. Slade, Mrs. Sprout, Hon. Mrs. R. M. Stuart-Wortley, Robert Vint, Sir Francis G. Walker, Bart., Jesse W. Ward, Miss C. Weguelin, Miss M. O. Wells, C. H. B. Whitworth, Tudor Williams.

Fellows resident abroad (2).—Lieut.-Colonel H. J. McLaughlin (Bloemfontein), John Weddell (Pietermaritzburg).

Societies affiliated (8).—Crawley and District Gardeners' Mutual Improvement Association, Lincolnshire Daffodil Society, Merthyr and District Horticultural Society.

A lecture on "Fruit-growing in British Columbia," illustrated by lantern slides, was given by the Hon. J. H. Turner (see Vol. xxix p. 485).

GENERAL MEETING.

MARCH 14, 1905.

Mr. J. W. ODELL in the Chair.

Fellows elected (78).—J. Allenspach, Allan Aynesworth, Frederick Barnett, W. E. Barnett, A. C. Bartlett, Dr. J. N. Blachford, Alex. J. Boyd, Mrs. Francis Bright, Mrs. G. Dickinson Byfield, Mrs. A. Carrington, Mrs. Myra Carrington, Mrs. Charlesworth, Rev. H. W. Cholmeley, L. C. G. Clarke, Miss H. H. Colvill, Mrs. Dundas, R. J. Durham, P. G. Feilden, Miss Ethel Forbes, Mrs. Foster, G. J. Fowler, Lewis French, Mrs. Greaves, Rev. E. F. Green, Hon. Vicary Gibbs, B. W. Hall, Lionel W. Harris, A. I. Hart, Lady Havelock-Allan, H. H. Hayden, Miss M. R. Hewlins, Martin F. Hitchin, Stuart J. Hogg, Mrs. Henry Acland-Hood, W. E. Knight, Mrs. R. H. S. Lewis, Mrs. Lindsay Lloyd, Mrs. Longman,

Mrs. A. Markham, Mrs. M. Marshall, Mrs. Oakley Maund, Mrs. T. Galton Moillet, Henry W. Pack, Joseph E. Palmer, Mrs. Pearce, Miss M. Pease, Mrs. Penfold, Mrs. M. M. Pitman, James H. Renton, Mrs. Frank Roberts, David Robertson, Miss Rooke, Horace E. Bossiter, Theophilus J. Salway, J.P., Mrs. A. P. Samuel, Miss Maud Savill, Mrs. Sinclair Scott, Mrs. Seaton, E. Nassau Senior, F. W. Sewell, Edward Sherwood, Walter Shipman, Abel Simner, Capt. Arthur Smith, Herbert Smith, Mrs. Kyrle Smith, Miss Constance Sprague, Miss A. F. Stainton, Alick T. Tassell, Arthur Tautz, S. M. Thomson, Mrs. Wallace Thornycroft, A. Trower, J. A. Vernon, J. F. Wright, Mrs. Wright, Mrs. J. K. Wright, A. Young.

Fellows resident abroad (2).—Lionel E. Kirwan (Madras), F. M. Maxwell-Lyte (Transvaal).

Associates (2).—Charles G. Blake, James Knight.

Societies affiliated (8).—Edmonton and District Horticultural Society; Ramsey Horticultural Society; St. Barnabas, Sutton, and District Horticultural Society.

A lecture on "Bud Variation," illustrated by lantern slides, was given by the Rev. Prof. G. Henslow, M.A., V.M.H. (see p. i.).

GENERAL MEETING.

MARCH 28, 1905.

Mr. A. L. WIGAN in the Chair.

Fellows elected (84).—Mrs. G. W. Agnew, G. B. Allen, J. F. Armitage, Mrs. E. Arnold, George Atkins, Miss Bayly, Rev. C. W. Bean, Ernest Bigland, B. Boothby, Herbert Born, T. E. Brandt, W. Bromilow, Capt. A. W. Buckingham, Henry E. S. Busby, R. H. Case, Henry C. Chapelow, Marchioness of Cholmondeley, J. A. Christie, A. E. Clarke, W. A. Coates, Mrs. A. V. Courage, Peter R. Courtenay, Miss M. G. Crawley, Mrs. E. Cutler, Mrs. D. Dawson, Mrs. E. B. Deacon, Mrs. S. Dodgson, Mrs. S. Eardley-Wilmot, Mrs. H. S. Everett, Mrs. R. A. Fairclough, Miss B. Feilden, Charles F. Fitch, I. Gibson Fleming, Dr. H. S. Fremlin, James Gambier, F. Gee, Mrs. J. E. Gladstone, Mrs. Gordon, Mrs. E. S. Hall, Mrs. A. Harvey, A. Stanley Herbert, Mrs. A. Knowles, Mrs. A. Latham, J. Orlands Law, Henry Lawson, William Lethbridge, Mrs. Leycester, John Lockyer, W. H. McConnel, Mrs. W. McCreery, James MacGregor, Mrs. McLean, Dowager Lady Manners, Mrs. Shaw-Lefevre Mildmay, Mrs. Moore, Mrs. Malcolm Morris, Robert E. Neal, Miss Neish, Standen Paine, Hon. Arthur L. Pelham, Harry A. Pinchbeck, Miss E. B. Pitman, Miss Pollitt, W. T. Rokeby Price, Mrs. W. Probert, H. C. Pulham, Lord Ravenscroft, Mrs. Broadley Reid, Mrs. F. Reid, Miss B. Savile, E. Claver Shoosmith, A. P. Simpson, Mrs. H. Graham Smith, W. P. Snell, Mrs. Spender-Clay, J. W. Squire, O. Staddon, G. F. E. Staples, Mrs. H. Stedall, Mrs. Stewart, Arthur Thomson, Mrs. Arthur Thomson, Miss K. M. Whitmore, W. J. Willis.

Fellows resident abroad (2).—C. H. K. Baillie (Canada), Ramesh C. Gupta (Calcutta).

Societies affiliated (6).—Addleston, Chertsey, and Ottersham Gardeners' Mutual Improvement Association; Colwyn Bay and District Horti-

cultural Society ; Huish Cottage Garden Society ; Pangbourne and District Gardeners' Mutual Improvement Association ; Panteg District Horticultural and Cottage Garden Society ; Sipson Horticultural Society.

A paper on "Bananas," by Mr. Frank Pink, was read by the Secretary (see p. 8).

COLONIAL FRUIT SHOW.

MARCH 30 AND 31, 1905.

LIST OF JUDGES.

Butt, George F.

Garcia, M. J.

Marshall, W.

Monro, George, V.M.H.

Pearson, A. H.

AWARDS.

Gold Medal.

Messrs. J. Phillips & Co., for West Indian fruits.

The Cape Orchard Co., for Cape fruits.

The British South Africa Co., for colonial produce.

Silver-gilt Knightian Medal.

The Duke of Rutland (gr. Mr. W. H. Divers), for Apples.

Messrs. Rivers & Sons, for Oranges in pots.

The Rhodes Fruit Farm Co., for Apples and Pears.

The Army and Navy Auxiliary, for a collection of fruit.

Messrs. Geo. Bunyard & Co., for Apples.

Miss H. Talbot, for Oranges and Lemons.

Silver-gilt Banksian Medal.

The Royal Mail Steam Packet Co., for West Indian fruits.

The Fruit Exporters' Association (South Africa), for a collection of fruit.

The Western Province Agricultural Society, for a collection of fruit.

The Meerlust Fruit Farm, for Apples and Plums.

Messrs. H. Cannell & Sons, for Apples.

Silver Knightian Medal.

Mrs. Hawkins, for Grapes.

The Agent-General for Nova Scotia, for Apples.

Messrs. Pink & Sons, for Bananas.

Messrs. Rose & Co., for Limes, &c.

The Army & Navy C. S., Ltd., for preserved fruits, &c.

Silver Banksian Medal.

Sir George Watt, M.B., K.C.S.I., C.I.E., for Indian photograph.

O. C. M. Barry, Esq., for Pears.

A. Nicholson, Esq., for Nectarines.

T. Michlem, Esq., for Pears.

The Agent-General for the Cape, for bottled fruit.

Bronze Knightian Medal.

To C. H. Beaumont, Esq., for Apples.

Bronze Banksian Medal.

To H. Meyers, Esq., for Pears.

GENERAL MEETING.

APRIL 11, 1905.

Mr. JAMES DOUGLAS, V.M.H., in the Chair.

Fellows elected (68).—A. E. Abbott, Miss N. Adey, Miss A. M. Aldrich, Miss K. Aldrich, Mrs. Ashby, Mrs. P. C. Ayers, Mrs. Bayden, Avigdor L. Birnstingl, Mrs. J. Hunter Blair, J. Holmes Blakesley, H. E. Boehmer, F. T. A. Bomert, C. E. Bullock, S. L. Burns-Lindow, Sir T. F. Buxton, Bart, M.P., Miss Ethel Buxton, Mrs. S. H. Candler, Lady Margaret Charteris, E. H. Collins, the Hon. Mrs. Cubitt, W. P. Curzon, Mrs. P. Cust, James Dietrichsen, Miss M. Dixon-Brown, Mrs. S. J. DuCroz, James Eckersley, H. Mackay Ellis, Sir Thomas Esmonde, Bart., Miss A. Fellows, Mrs. Fielden, Miss C. Fitzpatrick, Mrs. Payne Gallwey, John Hanson, N. Hayashi, Mrs. Henderson, J. Hewett Hooker, Miss L. T. Hume, Miss Irwin, Ernest Jeffery, Dowager Lady Jenner, Miss M. E. Johnson, Ireton A. Jones, Mrs. Cornwall Legh, Countess of Leitrim, Miss Mahon, Harry Manfield, Lewis G. Marens, Miss C. F. W. Matthew, E. R. Merton, Herbert Millington, Frederick Nichols, E. T. Nicholson, G. H. F. Nye, Mrs. Lancelot Orde, Bernard Peal, Lionel P. Perkin, Her Highness the Ranee of Sarawak, Mrs. L. S. Saunders, the Hon. Mrs. R. A. Smith, F. O. Streeten, H. E. Sugden, Mrs. E. M. Tylden, Mrs. D. Waterhouse, Miss E. G. Weare, Miss L. M. Wells, Leonard Westead, Col. G. C. Wynne, Miss E. Yeatman.

Societies affiliated (8).—Campbeltown Horticultural Society, Dorchester Gardeners' and Amateurs' Improvement Society, Llanbradach Horticultural Society.

A lecture on "Retarded Potatoes" was given by Mr. T. J. Powell (see vol. xxix. p. 481).

GENERAL MEETING.

APRIL 25, 1905.

Mr. GEORGE PAUL, V.M.H., in the Chair.

Fellows elected (55).—Miss H. M. Adair, Mrs. T. Ashton, Mrs. Assheton-Smith, T. Baring-Gould, Col. John Baskerville, John Bluck, Mrs. H. F. Boyd, Miss Calmar, Mrs. Campbell, Mrs. P. M. Crosthwaite, Miss Dugdale, Capt. R. R. Feilden, R. H. Francis, Laura Lady Grant, Mrs. E. Green, T. Farmer Hall, Countess of Halsbury, Lady Harrison, Mrs. O. Harrison, Major A. Hildebrand, Lieut. L. H. Hordern, R.N., Hon. Mrs. Howard, Lady Hutton, Miss F. E. Kane, Mrs. R. B. Leeds, Arthur C. Lehane, Mrs. A. Lucas, W. McFarlane, Dr. H. T.

Maw, Godfrey Nettlefold, Henry Isaac Orchard, Madam Bergman Osberberg, C. H. Owtram, Dr. Parrott, Mrs. H. Pease, D. Wire Pine, Miss E. C. Pirie, Miss C. Prosser, Miss M. E. Prosser, Henry Rawstorne, Mrs. Rennie, H. Lee Rutter, Lady Scourfield, F. J. Smith, Hon. W. F. D. Smith, M.P., Edward Stanford, W. Lowther Sysley, G. W. Tallents, Mrs. Thompson, Mrs. A. Thornton, Miss E. A. Gartside Tipping, C. W. R. Ward, W. Warren, Mrs. D. Waterhouse, H. Williams.

Fellow resident abroad (1).—R. Weatherspoon (Queensland).

Societies affiliated (4).—Acton Horticultural Society, Shepperton Horticultural Society, Chesterfield and District Chrysanthemum Society, Egham and District Gardeners' Mutual Improvement Association.

A paper on "The Making of Japanese Gardens in England" by Mr. James Hudson, V.M.H., was read by the Rev. W. Wilks, M.A., Secretary.

GENERAL MEETING.

MAY 9, 1905.

Mr. HARRY J. VEITCH, F.L.S., in the Chair.

Fellows elected (89).—Theophilus Allen, Lady Betty Balfour, Miss Banks, Col. Robert Barrie, Mrs. S. Barrow, Miss L. Bevan, Patrick L. Blyth, C. H. Broadhead, H. F. Brown, Mrs. C. Browne-Mason, Lady Campbell, Mrs. H. Carr, Mrs. Chaplin, Walter E. Collinge, Robert H. Collins, Mrs. Colman, V. B. D. Cooper, Mrs. C. Courtenay, Alexander Courthope, Mrs. M. S. Deacon, E. de la Rue, A. A. Delmege, J.P., Hon. George Eden, Mrs. Henry Edmunds, Mrs. Geddes, John P. Gee, L. N. Glass, Miss R. P. Glass, J. L. Goldie-Taubman, Mrs. Wyndham Gray, Hon. Mrs. A. Greville, W. W. Hale, W. B. A. Hales, M.A., G. Hastings, A. S. Hay, Walter Heald, R. J. Herbert, Mrs. Winsmore Hcooper, Mrs. Hope-Edwardes, Mrs. Hope-Wallace, Mrs. S. Horton, W. C. Jackson, Miss V. Kennard, Mrs. A. Kennedy, Mrs. Kingsbury, Miss M. H. Knobel-Harman, Mrs. P. Ogden Lawrence, John Linford, F. Moseby Lonergan, Mrs. B. Mercer, Hon. F. L. Meynell, Miss S. Minet, Mrs. Conyers Morrell, James T. Naylor, T. Norie-Miller, T. R. Ellis Olver, F. Pring, Mrs. D. J. Pullinger, Mrs. F. J. Rawson, Mrs. C. A. Reiss, Mrs. George Rennie, Miss Rogers, Sidney Rowntree, Mrs. H. C. Saunders, E. J. C. Savory, Joseph Shaw, H. Simpson, A. Smith, G. Springthorpe, Ashley Stables, Miss H. B. Stacey, Richard Stapley, Mrs. A. C. Stratten, A. R. Pym Sutton, E. P. Foquet Sutton, Major-Gen. L. V. Swaine, C.B., Major Harold W. Thatcher, Hon. Mrs. Tremayne, Col. F. M. Turner, John Waite, E. J. Walker, Miss M. B. Weber, Rev. R. A. White, F. Williams, Hon. and Rev. P. G. Willoughby, M.A., Major A. H. Wolley-Dod, Sir George Wolseley, Mrs. Wood, Cecil M. Woodbridge.

Fellows resident abroad (5).—Kenneth G. Atchison (Cape Colony), W. Brooks (Transvaal), A. G. Harris (Cape Colony), W. Hopkins (Natal), Norbert Levavasseur (France).

Associates (4).—Wm. A. Hurst, W. E. Martin, G. J. Nichols, H. A. Stone.

Society affiliated (1).—Ibis Horticultural Society.

A paper was read by Mr. Hayashi on "Japanese Horticulture," and another, illustrated by lantern slides, by Mr. R. Farrer on "Japanese Plants and Gardens" (see pp. 12 and 18).

DEPUTATION TO THE INTERNATIONAL HORTICULTURAL SHOW AT PARIS.

MAY 20, 1905.

THE Society was represented at the great International Horticultural Show at Paris in May, 1905, by Sir Albert Rollit, Bart., M.P., Major Holford, C.I.E., C.V.O., Mr. J. Gurney Fowler, Mr. Harry J. Veitch, F.L.S., and the Rev. W. Wilks, M.A. (Secretary), who were empowered by the Council to award the Society's medals to exhibits of conspicuous excellence. It is needless to say that the members of the deputation were welcomed with all the enthusiastic vivacity for which our friends over the Channel are so universally renowned; everything they could do to promote the geniality and friendly feeling of the meeting was done; and as a slight acknowledgment of the gracious reception accorded to the deputation by the President of the Republic and Madame Loubet, the Council presented him with the Society's Flora Medal in gold, suitably inscribed, with which Monsieur Loubet expressed himself as being much gratified.

AWARDS MADE AT PARIS.

Gold Medal.

Messrs. Vilmorin, for flowering plants.
Messrs. Croux, for flowering plants, Maples, and shrubs.
M. Moser, for flowering plants, Ferns, and shrubs.
Messrs. Vilmorin, for vegetables.

Silver-gilt Flora Medal.

M. Marcoz, for Orchids.
M. Begnier, for Phalænopsis.
M. Poirier, for Pelargoniums.
M. Ferard, for annuals and biennials.
The Syndicate of Florists of Paris, for floral decorations.
M. Lebaudy, for Begonias, Crotons, and Caladiums.

Silver-gilt Knightian Medal.

M. Cordouier for fruit.
M. Parent, for fruit.
M. Nomblot, for trained fruit trees.

Silver-gilt Banksian Medal.

M. Tabar, for *Iris Kämpferi*.
M. Derruder, for *Metrosideros floribunda*.
M. C. Simon, for Cacti and succulents.

Silver Flora Medal.

M. Boucher, for Clematis and Roses.
M. Paillet, for Tree Pæonies.

M. Leveque, for Roses.

The Syndicat Horticole de Paris, for plants and cut flowers.

M. Defresne, for Tree Pæonies and shrubs.

The Royal School of Florence, for Seedling Anthuriums.

M. Fargeton for Gloxinias and Hydrangeas.

Silver Knightian Medal.

M. Croux, for trained fruit trees.

GENERAL MEETING.

MAY 28, 1905.

The Hon. JOHN R. DE C. BOSCAWEN in the Chair.

*Fellows elected (148).—*Mrs. Julius Alington, Miss A. Allen-Brown, Miss D. Allen-Brown, Lady Ashburton, E. Bainbridge, C. M. Bartlett, H. H. Bartlett, G. Beaumont Beeman, Mrs. E. M. Benyon, W. T. Berners, Rev. R. A. C. Bevan, Lt.-Col. A. C. Borton, Henry W. Bradford, Arthur A. Brown, John M. Bruce, T. H. Bryant, Walter Butler, Sir Vincent Caillard, Lady Angela Campbell, Philip Castle, Mrs. Caton, Sen., Mrs. G. Charrington, G. W. Clark, F. J. Cole, Richard Combe, Edward Copsey, Lt.-Col. the Hon. C. Crichton, Mrs. Arthur Croft, Mrs. Baker Crosswell, David Cruikshank, Duncan Davidson, Lady Deane, Miss Dempster, Miss A. de Pass, Mrs. J. A. Dewar, Mrs. Noel Digby, Mrs. M. H. Dodge, Walter Durham, Miss A. G. Elin, Viscountess Emlyn, Mrs. F. Fanning, Hon. Mrs. Farquhar, Lady Ada Fitzwilliam, Wesley Forbes, C. Widenham Fosbery, G. Foulkes, Neil A. Gardner, Thomas W. Gardner, Miss Cecily George, G. T. Godfrey-Taussett, George Gordon, Miss A. Gordon, C. A. Hanson, Mrs. F. Hardie, C. H. Hastie-Robertson, Lady Constance Hatch, Miss Florence Hawker, C. E. Heath, Walter Henty, Mrs. Herbert, George Howse, Hon. James Hozier, C. J. Hurst, Rev. H. N. Hutchinson, Mrs. F. Curzon Ingle, John E. Jefferies, Miss Jessel, C. Jewell, Hon. Mrs. L. Johnston, G. H. Johnstone, Hudson Kearley, Mrs. Amy Kenyon, Miss D. Ketles, Miss Kinleside, Mrs. D. Kinloch, T. M. Kirkwood, J. H. Lane, Mrs. P. Leake, Mrs. Lewis, Dr. L. S. Little, Heathcote Long, R. Loveland-Loveland, K.C., L. B. Lovell, Mrs. A. J. McConnell, Mrs. E. P. Mack, Duncan Mackinnon, Miss E. Madgwick, Mrs. R. B. Magor, Lady E. Malet, Mrs. E. Manisty, Harry J. Martin, G. S. Mills, Hon. Mrs. P. Mitford, Sir Robert D. Moncreiffe, Albert J. Monk, C. R. Morley, Mrs. Moss-Cockle, Francis Muir, G. J. Newman, Edward H. Packe, Edward J. Pearson, Miss Phillips, W. R. Porter, Mrs. E. Posnett, Mrs. H. F. J. Powlett, Cecil F. Raphael, R. Rasmussen, Mrs. Guy Repton, Mrs. Hamlet Riley, Mrs. Rudduck, N. Rudge, David Russell, Mrs. Hugh E. Seeböhm, Horace Slade, Lady Barbara Smith, Sir Ernest Spencer, M.P., Lady Beatrix Stanley, Mrs. Wood Stephens, Mrs. Alex. S. Stephenson, E. E. Summers, Rt. Hon. J. G. Talbot, M.P., Edwin Tallack, A. H. Thistlethwayte, Walter Towne, Arnold Trinder, Lt.-Col. Edward Tufnell, Mrs. E. Tufnell, Mrs. W. A. Turner, W. Van de Weyer, Lady Victoria Villiers,

Mrs. Arthur Wagg, H. Wagner, Mrs. A. F. Wallace, Mrs. Wallace, Mrs. H. Walters, Miss E. Walton, Lady C. Waring, T. C. T. Warner, T. P. Warren, Lady Maud Warrender, W. A. Watts, F. Webber, George Weston, M.A., Mrs. Whetherly, Mrs. Whitelaw, Mrs. A. Wildy, J. W. Yerbury.

Fellows resident abroad (4).—H. E. V. Pickstone (Cape Colony), Mrs. M. Prain (Calcutta), L. A. Prins (Holland), M. Truffaut (France).

Associates (3).—Miss Ada Hunt, Donald MacBeath, H. T. Wilkin.

Society affiliated (1).—Corbridge and District Gardeners' Mutual Improvement Society.

A lecture on "Horticulture in Relation to Medicine," illustrated by lantern slides, was given by Mr. E. M. Holmes (see p. 42).

THE TEMPLE SHOW, 1905.

MAY 30, 31, AND JUNE 1.

JUDGES.

ORCHIDS.

Chapman, H. J.
Douglas, Jas., V.M.H.
Fowler, J. Gurney
Little, H.

ROSES.

Jennings, John
Lindsell, E. B.
Mawley, E.
Pemberton, Rev. J. H.

FRUIT AND VEGETABLES.

Challis, T., V.M.H.
McIndoe, J., V.M.H.
Norman, G., V.M.H.
Pearson, A. H.

GROUPS IN OPEN AIR.

Chapman, A.
Crump, W., V.M.H.
McLeod, J.
May, H. B.

HERBACEOUS, ROCK PLANTS, AND ALPINES.

Beckett, E.
Page-Roberts, Rev. F.
Shea, Charles E.
Thomas, Owen, V.M.H.

FOLIAGE PLANTS.

Bain, W.
Hudson, J., V.M.H.
Ker, R. Wilson

FLOWERING PLANTS.

Dean, R., V.M.H.
Howe, W.
Paul, G., V.M.H.
Salter, C. J.

MISCELLANEOUS.

Dixon, C.
Molyneux, E., V.M.H.
Odell, J. W.
Veitch, Peter

VEITCHIAN CUP.

Bennett-Poë, J. T., V.M.H.
Colman, Jeremiah
Lawrence, Sir Trevor, V.M.H.

Methven, J.
Pearson, C. E.
Tallack, J. C.

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on recommendation of the Fruit, Floral, and Orchid Committees will be found under their respective reports.

Veitchian Cup.

Messrs. Cripps, for shrubs.

Gold Medal.

Sir Frederick Wigan, Bart., for Orchids.

Sir Alexander Henderson, Bart., M.P., for fruit and vegetables.

Messrs. James Veitch, for stove and greenhouse plants.

Messrs. F. Sander, for Orchids and Nicotiana.

Messrs. Cutbush, for Carnations and alpine.

Messrs. Paul & Son, for Roses.

Messrs. Charlesworth, for Orchids.

Messrs. Cripps, for shrubs.

Messrs. Sutton, for greenhouse plants.

Messrs. Wallace, for alpine and Lilies.

Silver Cup.

Frank Lloyd, Esq., for Begonias.

S. Heilbut, Esq., for fruit.

Jeremiah Colman, Esq., for Orchids.

W. James, Esq., for Carnations.

Reading College, for vegetables.

Messrs. Cypher, for Orchids.

Messrs. Richard Smith, for Clematises.

Messrs. Cannell, for Cannas and vegetables.

Messrs. Barr, for alpine.

Messrs. Bunyard, for fruit and hardy plants.

Messrs. Peed, for Caladiums.

Messrs. Cuthbert, for hardy Azaleas.

Messrs. Cheal, for alpine.

Messrs. Wm. Paul, for Roses.

Messrs. Rivers, for fruits.

Messrs. Hill & Sons, for Ferns.

Messrs. H. B. May, for Ferns and flowers.

Messrs. Warr, for herbaceous plants and Begonias.

Messrs. Chas. Turner, for Roses.

Messrs. Bruce, for Sarracenias.

Messrs. Backhouse, for alpine.

Messrs. Pritchard, for alpine.

Messrs. F. Cant, for Roses.

Messrs. G. Mount, for Roses.

Silver-gilt Flora Medal.

- Mr. R. Irwin Lynch, for Gerberas.
- Messrs. Carter, for flowers and vegetables.
- Mr. L. R. Russell, for shrubs, &c.
- Messrs. J. Laing, for Gloxinias and Begonias.
- Messrs. Dobbie, for hardy plants.
- Messrs. Hugh Low, for Carnations, &c.
- Messrs. Fisher & Sibray, for shrubs.
- Messrs. B. Cant, for Roses.
- Messrs. J. Waterer, for Rhododendrons.
- Messrs. Jackman, for hardy plants.
- Mr. R. Sydenham, for Sweet Peas.
- Messrs. Bull, for Orchids.
- Messrs. Blackmore & Langdon, for Begonias.
- Mr. Notcutt, for hardy plants.
- Mr. Perry, for hardy plants.
- Mr. D. Russell, for trees and shrubs.
- Messrs. Hobbies, Ltd., for Roses and miscellaneous plants.

Silver-gilt Knightian Medal.

- Mr. Mortimer, for Cucumbers and Tomatoes.
- Messrs. Laxton, for Strawberries.

Silver-gilt Banksian Medal.

- Mr. W. J. Godfrey, for hardy flowers.
- Mr. H. J. Jones, for hardy flowers.
- Messrs. Hogg & Robinson, for Tulips.
- Mr. A. Dickson, for Tulips.
- Messrs. Baker, for hardy plants.
- Mr. Geo. Reuthe, for hardy plants.
- Mr. W. Iceton, for Lilies of the Valley.

Silver Flora Medal.

- Lord Aldenham, for flowering trees and shrubs.
- E. Ascherson, Esq., for Ferns.
- John Rutherford, Esq., M.P., for Orchids.
- E. Wagg, Esq., for Carnations.
- Messrs. Jones & Son, for Sweet Peas, &c.
- Messrs. Watkins & Simpson, for annuals.
- Mr. John Robson, for Orchids.
- Mr. A. F. Dutton, for Carnations.
- Messrs. Kelway & Son, for hardy herbaceous plants

Silver Knightian Medal.

- Hon. A. H. T. Montmorency, for Potatoes, &c.
- Mr. A. J. Harwood, for Asparagus.
- Lady Warwick College, for vegetables.
- Mr. Charles Ritchings, for Tomatoes.

Silver Banksian Medal.

T. H. Lowinsky, Esq., for Calceolarias.
 Mr. A. Belin, for Asparagus.
 Mr. Wm. Sydenham, for Violas.
 Messrs. B. S. Williams & Son, for hardy cut flowers.
 Mr. C. W. Breadmore, for Sweet Peas, &c.
 Mr. H. C. Pulham, for alpinas.
 Mr. R. Farrer, for alpinas.
 Guildford Hardy Plant Co., for alpinas.
 Messrs. R. H. Bath, for Carnations, &c.
 Mr. T. Jannock, for Lilies of the Valley.
 Messrs. W. Fromow & Sons, for Maple.
 Mr. A. Ll. Gwillim, for Begonias.

Bronze Knightian Medal.

Mr. R. Stephenson, for Asparagus.

GENERAL MEETING.

JUNE 20, 1905.

Mr. JOSEPH CHEAL in the Chair.

Fellows elected (181).—William Agate, Miss Aldam, Lady Balcarres, Mrs. A. R. Bellingham, G. H. Blount, C. Bogler, Miss A. E. Bradshaw, Lady Bray, Frank Brazier, Mrs. Brown-Westhead, Percy Bucknall, Rev. H. Buckston, Miss Budgett, J. C. Bull, Arthur H. Bunney, A. E. F. Burder, Mrs. Burman, Mrs. F. Butcher, Marsom Butfield, Noel Buxton, M.P., Mrs. Buxton, Mrs. L. Cattley, W. Cattley, G. Cawston, A. D. Chapple, W. H. Charlton, C. D. Clark, Mrs. Clark, J. S. Cohen, Dr. Louis Colbourne, C. Cooper, C. B. Crisp, J. W. Dawson, Miss L. E. Denison, William Duke, Lady Florence Duncombe, C. H. Dunderdale, G. Dunford, A. F. Durlacher, Almeric FitzRoy, C.V.O., Mrs. G. Malcolm Fox, Miss Garcia, Frank Girdlestone, Mrs. C. P. Gosnell, Mrs. M. Grayling, R. C. Griffith, Mrs. C. Hawksley, J. R. Heaven, W. J. Hill, Mrs. A. F. Hirschel, Mrs. A. F. Hirtzel, Mrs. Hole, A. G. Holford, G. H. Hollingworth, R. L. Hunter, Miss A. Hutchinson, Col. H. S. Jarrett, C.I.E., Walter Johnstone, Miss I. Jones, Miss D. H. Keller, Mrs. W. Langridge, Maj. Gen. de H. Larpent, Hon. Mrs. A. Lawson, G. Leonard, Lady Lethbridge, Robert Lyell, A. Vesey Machin, Miss Mackenzie, Mrs. Mackenzie, R. L. F. McMullin, Mrs. R. B. Martin, John H. Master, J. D. Milburn, Miss G. Mills-Baker, Mrs. W. F. Mitchell, Miss Carrick Moore, Mrs. W. E. Moore, Robert Moore, Chas. Murray, Miss Muschamp, Mrs. J. Pirie Nichol, P. Berry Owen, Claud Paine, Mrs. Basil Peto, Mrs. Preston, Mrs. Ransome, Miss Maud Read, Mrs. Leslie Renton, Hon. Mrs. Munez Robinson, Vice-Admiral E. Neville Rolfe, Lionel de Rothschild, Lady Rycroft, C. J. Scott, T. Scott, Mrs. Malcolm Seton, Felix Seys, Miss J. A. Smith, Mrs. Parker Smith, Mrs. Smyth, Mrs. A. E. Staley,

E. P. Stephens, Miss J. Stephenson, Miss C. Sturt, Miss E. M. Swabey, T. C. Tatham, Mrs. Beaumont Thomas, W. Touch, C. E. Tritton, Marchioness of Tullibardine, Mrs. H. M. Tulloch, A. Van den Bogaerde, R. G. Vivian, Lady Waechter, A. F. Wallace, Arthur F. Walrond, W. H. Ward, D. Watson, Edward Weber, Mrs. E. Whitehead, G. A. L. Whitelaw, Mrs. M. Whittington, Mrs. E. A. Wilde, Sir W. Wilkin, K.C.M.G., Mrs. Lewis Williams, Mrs. Willink, Miss Townshend Wilson, Miss Wingfield, Mrs. Charles Wood, Thomas Wood, F. W. Wooster, Mrs. Oliver Young.

Fellows resident abroad (7).—George Arends (Germany), L. J. Draps-Dom (Belgium), Firmin Lambeau (Brussels), Charles Madoux (Brussels), Woldemar Neubert (Hamburg), H. A. Marriner (New Zealand), J. F. Smith (Guernsey).

Associate (1).—William McCreath.

Societies affiliated (8).—Cockermouth and District Horticultural and Industrial Society, South Shields Floral Horticultural and Industrial Society, Tolleshunt D'Arcy and adjoining Parishes Horticultural Society.

A lecture on "Plants of the Bible," illustrated by lantern slides, was given by the Rev. Prof. Geo. Henslow, M.A., V.M.H.

GENERAL MEETING.

JULY 4, 1905.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H. (President of the Society), in the Chair.

Fellows elected (48).—James Ashdown, Miss E. F. Atherley, R. Bankes Barron, Hon. Ben Bathurst, A. H. Beeby, William H. Blackman, Mrs. E. Bristowe, Mrs. R. Bruce, Richard Burbidge, Mrs. Burt, Hon. Mrs. Julian Byng, Mrs. Conyers-Lewer, M. H. Davidson, Henry J. Davis, Captain Farwell, S. H. Faudel-Phillips, Mrs. Fell, Miss Forlong, P. Foster, M.P., Sydney Gedge, G. Gibson, Mrs. Gray, Daniel Hack, Col. Godfrey Hildebrand, A. H. James, Mrs. James, Mrs. H. Maconochie, Sir Charles Metcalfe, E. R. Morris, Miss R. Morris, Mrs. Mowatt, William P. Paddock, Arthur Parry, Mrs. Peplow, G. Peto, Mrs. Phipps, Lady Reid, Mrs. E. Robinson, Mrs. P. E. Savage, Mrs. Robert Smith, James R. Solomon, Miss M. L. Symons, A. D. Thompson, Major D. B. Thomson, Mrs. E. H. Tubbs, Mrs. J. Langfield Ward, Charles A. Whitmore, H. M. Woolley.

Fellows resident abroad (2).—Miss Dike (New York), Frank Frith (Transvaal).

Associates.—(2) J. Burfoot, James Chapman.

Owing to unavoidable circumstances, the lecture on "The Progress of Horticulture in the United States," by Prof. H. J. Webber, which had been announced for this date, was postponed.

SUMMER SHOW, 1905.

JULY 11, 12 and 18, IN THE GROUNDS OF CHELSEA HOSPITAL.

JUDGES.

ORCHIDS.	HERBACEOUS, ROCK, AND ALPINE PLANTS.
Chapman, H. J.	Bennett-Poë, J. T., V.M.H.
Douglas, J., V.M.H.	Divers, W. H.
Fowler, J. Gurney	Pearson, C. E.
Little, H.	Shea, Chas. E.
ROSES.	FLOWERING PLANTS.
Philbrick, Miss	Bates, W.
Wilks, Rev. W.	Howe, W.
Willmott, Miss, V.M.H.	Nicholson, Geo., V.M.H.
FRUIT AND VEGETABLES.	Reynolds, G.
Challis, T., V.M.H.	MISCELLANEOUS.
McIndoe, J., V.M.H.	Dixon, C.
Norman, G., V.M.H.	Molyneux, E., V.M.H.
Pearson, A. H.	Odell, J. W.
GROUPS IN OPEN AIR.	IMPLEMENTS, &C.
Chapman, A.	Beckett, E.
Jennings, John	Gibson, Jas.
McLeod, J.	Mortimer, S.
FOLIAGE PLANTS.	Poupart, W.
Bain, W.	
Fielder, C. R.	
Ker, R. Wilson	

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION
WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Fruit, Floral, and Orchid Committees will be found under their respective reports.

Gold Medal.

Jeremiah Colman, Esq., for Orchids.

Mr. H. B. May, for Ferns.

Messrs. Wallace, for herbaceous plants and Lilies.

Messrs. Wm. Paul, for Roses.

Messrs. Charlesworth, for Orchids.

Messrs. Cutbush, for herbaceous plants.

Silver Cup.

Leopold Rothschild, Esq., for fruits.

Lady Harmsworth, for Carnations.

L. Currie, Esq., for Water Lilies.
 Messrs. Carter, for flowers and vegetables.
 Messrs. Bunyard, for fruit trees and herbaceous plants.
 Messrs. Barr, for herbaceous plants.
 Messrs. Ware, for Begonias.
 Messrs. Paul & Son for Roses.
 Messrs. Sander, for Orchids.
 Messrs. Cripps, for trees and shrubs.
 Messrs. Jackson, for Roses and herbaceous plants.
 Mr. Amos Perry, for herbaceous plants.
 Messrs. Bull, for ornamental plants.
 Mr. J. Hill, for Ferns.
 Messrs. Blackmore & Langdon, for Begonias.
 Mr. David Russell, for trees and shrubs.

Silver-gilt Flora Medal.

Sir F. Wigan, Bart., for Orchids.
 Mr. Reg. Farrer, for alpine.
 Mr. H. J. Jones, for Sweet Peas, &c.
 Mr. M. Pritchard, for herbaceous plants.
 Mr. L. R. Russell, for trees and shrubs.
 Mr. Box, for Begonias.
 Messrs. Hugh Low, for Carnations, &c.
 Messrs. Pulham, for rockwork and alpine.
 Mr. Riley, for summer-houses.

Silver-gilt Banksian Medal.

Messrs. Jones & Sons, for Sweet Peas and Carnations.
 Messrs. G. & A. Clark, for herbaceous plants.
 Messrs. Peed, for herbaceous plants.
 Messrs. Cheal, for herbaceous plants and shrubs.
 Messrs. A. F. Dutton, for Carnations.
 Mr. W. Wood, for sundries.
 Manifattura di Signa, for terra-cotta vases.
 Messrs. Merryweather, for spraying, &c. machines.
 Mr. Castle, for garden furniture and seats.
 Messrs. Champion, for tubs for shrubs.

Silver-gilt Knightian Medal.

Mr. Mortimer, for Melons.

Silver Flora Medal.

E. Wagg, Esq., for Carnations.
 Messrs. Laing, for Caladiums.
 Messrs. Cannell, for Cacti, &c.
 Mr. Breadmore, for Sweet Peas.
 Mr. Reuthe, for alpine.
 Messrs. Hobbies, for Roses, &c.
 Mr. Ladhams, for herbaceous plants.
 Mr. Bath, for Sweet Peas and Roses.

Mr. V. Stade, for Palargoniums.
 Messrs. Reamsbottom, for Anemones.
 Messrs. Fromow, for shrubs.
 Messrs. Liberty, for terra-cotta vases.

Silver Knightian Medal.

Swanley College, for Melons.

Silver Banksian Medal.

H. P. Sturgis, Esq., for Strawberries.
 Misses Hopkins, for herbaceous plants.
 Messrs. B. S. Williams, for herbaceous plants
 Mr. J. Forbes, for Phlox and Pentstemons.
 Mr. Penwill, for Raspberries.
 Messrs. Stark, for Sweet Peas.
 Mr. Jas. Douglas, for Carnations.
 Mr. F. Unwin, for Sweet Peas.
 Messrs. Gilbert, for herbaceous plants.
 Mr. Gwillim, for Begonias.
 Mr. Bentley, for sundries.
 Messrs. Corry & Co., for sundries.
 Messrs. Dollond, for instruments.
 Messrs. Shanks, for lawn mowers.
 Mr. Dowell, for Orchid pots.
 Anglo-Continental, for fertilisers.
 Messrs. Doulton, for terra-cotta pots, &c.
 Mr. J. K. King, for Sweet Peas.
 Mr. Jas. George, for sundries.
 Mr. T. Green, for lawn mowers.
 Mr. W. Herbert, for sundries.
 Mr. T. Syer, for ladders and tools.
 Mr. J. Williams, for table decoration.
 Mr. de Luzy, for sprayers.
 Mr. Sage, for sundries.
 Mr. Pinches, for labels.
 Economic Fencing Co., for fencing.

GENERAL MEETING.

JULY 18, 1905.

Mr. HARRY J. VEITCH, F.L.S., in the Chair.

Fellows elected (88).—J. Rose Bradford, F.R.S., Percy R. Bristowe, Mrs. A. P. Cazenove, Miss E. Clutton, J. M. Courage, Robert C. Cowan, Temple T. Cowell, Mrs. Edinger, James Faulkner, F. H. Gardner, Mrs. C. Godfrey, Mrs. C. O. Hall, Miss Lucy Hope, Miss Irving, Gen. Sir Ronald Lane, K.C.V.O., C.B., A. W. Lobb, Miss S. Longman, Mrs. Herbert Miles, Martin Muir, Mrs. Munro, E. Hay Murray, A. C. Newbigging, W. S. Patey, W. G. Perrin, Lady Prinsep, E. A. Read, Miss H. M. Rigby, Miss K. N. Rogers, Arnold L. Satow D. A. Seligman,

S. A. Sillem, Mrs. Francis Siltzer, John C. Smith, Miss Streatfield, H. R. Taylor, James Tyson, Rev. N. Sydney Woods, Henry A. Woodwell.

Fellows resident abroad (2).—James Clark (Pretoria), W. D. Wells (Johannesburg).

A lecture on "Wisley Gardens," illustrated by lantern slides, was given by Mr. S. T. Wright (see p. 62).

GENERAL MEETING.

AUGUST 1, 1905.

Mr. WILLIAM CUTHBERTSON in the Chair.

Fellows elected (28).—Arthur I. Atkinson, R. Harvey Barton, W. Napier Church, Mrs. Henry Clowes, Miss M. Cobb, Charles W. Cooke, Mrs. Daniel, Miss M. English, Mrs. G. Gosling, John Harding, Ralph Hindmarsh, Mrs. W. E. Horne, Miss Esther Ives, Miss Lushington, R. Richter MacLaren, G. K. MacLean, Canon the Hon. and Rev. H. Mostyn, Miss E. Mostyn, William J. Phillips, J. J. Read, Ranson Rickaby, Mrs. Lawrence Simpson, Countess of Wilton.

Fellows resident abroad (8).—James G. Duncan (Cape Colony), E. W. Griffiths (Johannesburg), M. Murphy (New Zealand).

A lecture on "British Ferns and their Wild Sports," illustrated by lantern slides, was given by Mr. C. T. Druery, V.M.H. (see p. 77).

GENERAL MEETING.

AUGUST 15, 1905.

Mr. GEORGE BUNYARD, V.M.H., in the Chair.

Fellows elected (19).—H. Allhusen, M.P., Lady Marcus Beresford, Tatton H. Bower, Mrs. Tatton H. Bower, Arthur Brennan, W. G. Craig, Mrs. Finlay, L. M. G. Fraser, Miss M. Jefferies, George King, C. E. Layton, Countess of Lovelace, Mrs. Victor Marshall, E. C. Mumford, John C. Murray, Lady St. Helier, W. Taylor, A. Thoburn, Miss West.

Fellows resident abroad (2).—Alaricus Delmard (Grand Canary), Thomas Micklem (South Africa).

A paper by Prof. H. J. Webber, of the United States Department of Agriculture, was read on the "Progress of Fruit Culture in the United States" (see vol. xxx. p. 157).

GENERAL MEETING.

AUGUST 29, 1905.

Sir ALBERT KAYE ROLLIT, M.P., in the Chair.

Fellows elected (14).—Mrs. W. R. Arbuthnot, Mrs. A. Banks, Thomas O. Jones, John R. Kershaw, A. O. Launders, Lieut.-Col. C. W. Long, Mrs. W. Rochfort, Mrs. F. Sexton, C. Simpson, Mrs. W. Smellie, Mrs. W. Tongue, Sir Montagu C. Turner, J. Vivian, Lady Westbury.

Fellows resident abroad (5).—G. Chattopadhyay (India), F. Griffith (Orange River Colony), H. F. Macmillan (Ceylon), B. F. Passementier (Transvaal), C. E. Robinson (Cape Colony).

Associates (2).—Miss A. Salzmänn, H. Towell.

A paper on "Trees for Towns," by Mr. R. Lewis Castle, was read by the Assistant-Secretary (see p. 84).

GENERAL MEETING.

SEPTEMBER 12, 1905.

Mr. JOHN GREEN in the Chair.

Fellows elected (17).—Col. H. W. Barrett, T. E. Carey Bates, Robert Brodie, H. M. Eddie, Lady Constance Emmott, John Fraser, Harold Granger, Arthur Hall, J. W. Hardy, Miss M. Martin Leake, A. Rokeby Price, Edwin Skewis, Mrs. Spencer Smith, Walter J. Smith, John Stoney, G. A. Taylor, Christopher Tonge.

Fellows resident abroad (2).—Miss A. Lowell (U.S.A.), Miss E. Seccombe (U.S.A.).

Associate (1).—A. Wallace.

Society affiliated (1).—Manawatu and West Coast Agricultural and Pastoral Association.

A lecture on the "Meaning of Natural Selection," illustrated by lantern slides, was given by the Rev. Prof. G. Henslow, M.A. (see p. 90).

DEPUTATION TO THE INTERNATIONAL FRUIT AND FLOWER SHOW AT EDINBURGH.

SEPTEMBER 13, 1905.

A DEPUTATION consisting of Sir Trevor Lawrence, Bart., K.C.V.O. (President), Mr. George Bunyard, V.M.H., Mr. James Hudson, V.M.H., Mr. A. H. Pearson, Mr. H. B. May, Mr. H. J. Veitch, F.L.S., and the Rev. W. Wilks (Secretary), visited the International Horticultural Exhibition at Edinburgh. The deputation met with every kindness and attention, and received a truly Scotch welcome.

This International Show has created the greatest interest among horticulturists throughout the whole country. Entries were made from all parts of England, Scotland, and Ireland, to the number of 1,860 in 253 classes; one large Parisian firm—Vilmorin-Andrieux & Cie.—also entered the lists. It can safely be said that a better show was never seen in the Waverley Market. The whole of the floor space of the market did not suffice to give accommodation to all the exhibits, which overflowed into the galleries and on to the roof garden. The latter for the three days of the show was converted, in a simple but effective manner, into a private enclosure, where quite a number of good things were on view. The Market Hall itself presented a splendid appearance. The exhibition of grapes and of hothouse and hardy fruits was large and interesting, and did credit to the cultural skill of the gardeners and nurserymen who

exhibited them. In the classes for grapes there were over 400 bunches entered.

The ceremony of declaring the show open was performed at noon by Lord Balfour of Burleigh, President of the Royal Caledonian Horticultural Society (under whose auspices the show was held), who was accompanied on the platform by Sir Trevor Lawrence, Bart., K.C.V.O. His Lordship concluded his address by welcoming the deputation from the Royal Horticultural Society of England, who were their good neighbours, and whose friendly rivalry in doing good for horticulture they recognised.

Sir Trevor Lawrence, in the course of a brief speech, said the members of the deputation which he headed agreed that it had rarely been their good fortune to attend a more satisfactory show or one giving evidence of greater skill and greater enterprise. He was glad to say that they had been able to award several of the medals of the Royal Horticultural Society, and it was not without considerable difficulty that they had been able to decide which exhibitors should receive them.

AWARDS MADE AT EDINBURGH.

Gold Medal.

The Corporation of Glasgow, for interesting botanical plants.
Messrs. James Veitch, for group of plants and fruit.
Mr. David Thomson, for group of plants and shrubs.

Silver-gilt Hogg Medal.

The Earl of Harrington (gr. J. H. Goodacre), for fruit.
Messrs. Vilmorin & Cie., for vegetables.

Silver-gilt Flora Medal.

Sir Wilfrid Lawson, Bart., for group of plants.
Messrs. Wallace, for hardy flowers.
Messrs. Cocker, for Roses.
Messrs. Charlesworth, for Orchids.
Mr. J. Downie, for group of plants.

Silver-gilt Knightian Medal.

Lord Aldenham (gr. Mr. E. Beckett), for vegetables.
The Duke of Portland (gr. J. Gibson), for vegetables.
Messrs. Sutton, for fruit and vegetables.

Silver-gilt Banksian Medal.

Messrs. Dobbie, for hardy flowers.
Messrs. Cutbush, for group of plants.
Messrs. Ware, for Begonias.
Messrs. Cunningham & Fraser, for hardy plants.
Mr. A. E. Campbell, for Gladioli.
Mr. J. Phillips, for group of plants.
Mr. A. J. A. Bruce, for insectivorous plants.
Mr. J. Smellie, for Cactus Dahlias.

Silver Hogg Medal.

Mrs. J. Armistead, for fruit.
Messrs. Bunyard, for Apples.

Silver Knightian Medal.

Messrs. Storrie & Storrie, for fruit trees in pots.

Silver Flora Medal.

Messrs. Hobbies, for Cactus Dahlias.
Mr. John Forbes, for Dahlias and Pentstemons.
Mr. A. Bryden, for herbaceous plants.

Silver Banksian Medal.

Mr. Norman Davis, for Chrysanthemums.
Mr. R. Bolton, for Sweet Peas.
Mr. J. Logan, for Apples.

GENERAL MEETING.

SEPTEMBER 26, 1905.

Mr. JAMES DOUGLAS, V.M.H., in the Chair.

Fellows elected (12).—David Catt, G. S. Crawshay, Hugh W. Drummond, J. Varley Fitness, Miss M. G. Giles, James Harris, W. A. Hosmer, Mrs. R. H. Lang, Leonard Messel, J. E. Ward, Frederick Wicks, W. H. Youngman.

Societies affiliated (2).—Cheadle and Cheadle Heath Floral Horticultural Society; Shipbourne, Plaxtol, and District Horticultural Society.

A lecture on "Autumn Roses" was given by Mr. W. F. Cooling.

GENERAL MEETING.

OCTOBER 10, 1905.

Mr. J. GURNEY FOWLER in the Chair.

Fellows elected (32).—Mrs. Baldwin, Joseph Bish, Lieut.-Col. A. Brooke, Jun., Arthur Brown, Hon. Mrs. Chetwynd, M. W. Dance, Mrs. Duggan, E. A. Ferry, Mrs. J. F. Fowke, W. A. Franchen, Philip Garcia, A. D. Henderson, Mrs. E. Hennell, Mrs. M. Hughes, Miss A. Johnson, Conway Jones, G. A. Lawrence, H. Lindley, Rev. Percy Lloyd, H. E. Luxmore, Ernest Meyer, Rev. Vyvyan H. Moyle, J. J. Neale, Major H. Paterson, Frank Pierpont, Dr. Byron Robertson, Edgar W. Robertson, Mrs. H. Scott, Mrs. Swainson, Mrs. Waterlow, R. H. Wilson, F. C. L. Wratten.

Fellows resident abroad (5).—W. Robertson Brown (India), E. W. Hodge (Transvaal), Howard F. Levien (Australia), Mrs. Lord (France), R. F. Thomas (Australia).

Associates (3).—S. R. Crofts, Miss M. G. Foster, Henry Harber.

D D

A Conference on Fruit-growing, held under the united auspices of the National Fruit-growers' Federation and the Royal Horticultural Society, opened at 2.30 P.M.

For the Full Report of this Conference see R.H.S. JOURN., vol. xxx., and also for the list of prizes awarded to growers of British Fruit, see JOURN. R.H.S., vol. xxx. p. 115.

GENERAL MEETING.

OCTOBER 24, 1905.

Mr. ALEXANDER DEAN in the Chair.

Fellows elected (24).—Rev. P. Armitage, Miss A. Bagot, Mrs. Bardswell, Mrs. W. Bellairs, E. Lloyd Biddlescombe, G. Noster Clark, Frank Dawes, Joseph Deas, A. Norman Flack, Mrs. J. Forbes, Mrs. Goldring, J. Guttridge, J. Harper, Miss H. G. Horwood, Miss J. A. Horwood, Cecil E. Maples, C. S. Martin, W. H. Matthews, Miss A. M. Morton, G. Parker, Mrs. Sewell, W. C. Smith, H. L. Stepney, E. Dent Vaisey.

Associate (1).—George Bond.

A lecture on "Potatoes" was given by Mr. W. P. Wright (see p. 97).

BRITISH-GROWN VEGETABLE SHOW.

OCTOBER 24, 1905.

PRIZE LIST.

(The address and the Gardener's name are entered on the first occurrence, but afterwards only the Owner's name is recorded.)

DIVISION I.

Class 1.—Collection of Vegetables occupying not more than 60 square feet (*i.e.* 20 × 8). Open to the Trade only.

Silver-gilt Knightian Medal.

Messrs. Cannell, Swanley.

Class 2.—Collection of Vegetables occupying not more than 30 square feet (*i.e.* 10 × 8). Open to the Trade only.

Silver Knightian Medal.

Messrs. J. Cheal, Crawley.

Class 3.—Collection of Vegetables occupying not more than 86 square feet (*i.e.* 12 × 8). Amateurs and Gardeners.

First Prize, Silver Cup (value £10); Second, £5; Third, £3;

Fourth, £2.

1. Lord Aldenham, Elstree (gr. E. Beckett).

2. }

3. }

4. }

No awards.

Class 4.—Collection of Vegetables occupying not more than 24 square feet (*i.e.* 8 × 8). Amateurs and Gardeners.

First Prize, Veitch Memorial Medal and £5; Second, £3;
Third, £2; Fourth, £1.

1. John Kerr, Esq., Hemel Hempstead (gr. H. Folkes).
2. The Earl of Wilton, Basingstoke (gr. J. Bowerman).
3. } No awards.
4. }

Class 5.—Collection of Pumpkins and Gourds occupying not more than 80 square feet (*i.e.* 10 × 8). Open.

Prizes, Medals.

No entry.

Class 6.—Collection of 18 Varieties of Potatoes, 6 tubers of each. Open to the Trade only.

Silver Knightian Medal.

Mr. R. W. Green, Wisbech.

Class 7.—Collection of 12 Varieties of Potatoes, 6 tubers of each. Amateurs and Gardeners. Exhibitors in Class 7 must not enter in Classes 45 and 46.

First Prize, £2; Second, £1 10s.; Third, £1.

1. Earl Spencer, Althorp Park (gr. S. Cole).
2. Earl of Carnarvon, Newbury (gr. W. Pope).
3. No award.

Class 8.—Collection of 6 Varieties of Yellow-fleshed Potatoes, 6 tubers of each. Open to the Trade only.

Prizes, Medals.

No award.

Class 9.—Collection of 8 Varieties of Yellow-fleshed Potatoes, 6 tubers of each. Amateurs and Gardeners.

First Prize, 10s.; Second, 7s.; Third, 4s.

No award.

NOTE.—In Classes 8 and 9 one Tuber at least of each variety will be put by the Judges.

DIVISION II.

Open to Gardeners and Amateurs only.

Unless otherwise stated, the Prizes in Division II. are uniformly—

First, 5s.; Second, 3s.; Third, 2s.

No one may enter in two classes in Division II. which differ only in respect of the number of plants, roots, tubers, &c., asked for.

No one may take more than one Prize in any one class.

Class 10.—6 Globe Artichokes.

1. Lord Aldenham.
2. } No awards.
3. }

Class 11.—24 Dwarf or Climbing French Beans.

1. Lord Aldenham.
2. H. Partridge, Esq., Bletchingley (gr. J. W. Barks).

Class 12.—24 Scarlet or White Runner Beans.

1. Lord Aldenham.
2. The Earl of Wilton.
3. H. Partridge, Esq.

Class 13.—6 Beet, round.

1. The Earl of Carnarvon.
2. Lord Aldenham.
3. J. T. Charlesworth, Esq., Nutfield (gr. T. W. Herbert).

Class 14.—6 Beet, long.

1. Lord Aldenham.
2. Earl Spencer.
3. The Earl of Wilton.

Class 15.—6 Green Top Beet.

1. John Kerr, Esq.
2. Lord Aldenham.
3. No award.

Class 16.—8 Heads Borecole, green curled.

1. Lord Aldenham.
2. H. Partridge, Esq.
3. No award.

Class 17.—8 Heads Borecole, of any other variety.
No entry.

Class 18.—8 Heads Cauliflower or Autumn Broccoli.

1. Lord Aldenham.
2. Earl Spencer.
3. John Kerr, Esq.

Class 19.—8 Stems Brussels Sprouts.

1. Lord Aldenham.
2. John Kerr, Esq.
3. No award.

Class 20.—1 Dish of 50 Brussels Sprouts.

1. The Earl of Wilton.
2. The Earl of Carnarvon.
3. Walpole Greenwell, Esq., Godstone (gr. W. Lintott).

Class 21.—8 Heads of White Cabbage.

1. Lord Aldenham.
2. H. Partridge, Esq.
3. No award.

Class 22.—8 Heads of Colewort.

1. G. Hobday, Esq., Romford.
2. H. Partridge, Esq.
3. No award.

Class 23.—8 Heads of Red Cabbage.

1. Lord Aldenham.
2. G. Hobday, Esq.
3. No award.

Class 24.—8 Heads of Savoy.

1. G. Hobday, Esq.
2. Lord Aldenham.
3. John Kerr, Esq.

Class 25.—6 Carrots, stump rooted.

1. John Kerr, Esq.
2. Lord Aldenham.
3. G. Hobday, Esq.

Class 26.—6 Carrots, long or intermediate.

1. John Kerr, Esq.
2. The Earl of Carnarvon.
3. J. Rushbrook, Esq., Ampthill.

Class 27.—8 Heads of Celery, red.

1. Walpole Greenwell, Esq.
2. John Kerr, Esq.
3. J. Rushbrook, Esq.

Class 28.—8 Heads of Celery, white.

1. J. Rushbrook, Esq.
2. The Earl of Carnarvon.
3. John Kerr, Esq.

Class 29.—3 Roots of Celeriac.

1. J. Rushbrook, Esq.
2. } No award.
3. }

Class 30.—1 Brace of Cucumbers.

1. Lord Aldenham.
2. H. Partridge, Esq.
3. Walpole Greenwell, Esq.

Class 31.—3 Heads of Endive, curled leaf.

1. G. Hobday, Esq.
2. } No award.
3. }

Class 32.—8 Heads of Endive, broad leaf.

1. G. Hobday, Esq.
2. Walpole Greenwell, Esq.
3. J. T. Charlesworth, Esq.

Class 33. 1 lb. of Eschalots, small, shown in clusters.

1. John Kerr, Esq.
2. } No award.
3. }

Class 34.—1 lb. of Eschalots, large, single bulbs.

1. Lord Aldenham.
2. John Kerr, Esq.
3. No award.

Class 35.—6 Leeks.

1. Lord Aldenham.
2. G. Hobday, Esq.
3. No award.

Class 36.—8 Lettuce, Cabbage.

1. Lord Aldenham.
2. } No award.
3. }

Class 37.—8 Lettuce, Cos.

1. No award.
2. Lord Aldenham.
3. No award.

Class 38.—1 lb. of Mushrooms.

1. Lord Aldenham.
2. } No award.
3. }

Class 39.—6 Onions, white or brown.

1. The Earl of Wilton.
2. G. Hobday, Esq.
3. Noah Kneller, Esq., Basingstoke.

Class 40.—6 Onions, red.

1. Lord Aldenham.
2. J. T. Charlesworth, Esq.
3. No award.

Class 41.—1 lb. of Pickling Onions.

1. Lord Aldenham.
2. John Kerr, Esq.
3. Earl Spencer.

Class 42.—8 Plants of Parsley, in pots.

1. Earl Spencer.
2. H. Partridge, Esq.
3. No award.

Class 43.—6 Parsnips.

1. Earl Spencer.
2. John Kerr, Esq.
3. G. Hobday, Esq.

Class 44.—25 Pods of Peas, one variety

1. Lord Aldenham.
2. J. T. Charlesworth, Esq.
3. No award.

Class 45.—6 dishes of Potatoes, distinct (6 tubers of each).
First Prize, 10s. ; Second, 7s. ; Third, 4s.

No entry.

Class 46.—3 dishes of Potatoes, distinct (6 tubers of each).

1. J. T. Charlesworth, Esq.
2. } No award.
3. }

Class 47.—12 roots of Salsafy.

1. J. Rushbrook, Esq.
2. Lord Aldenham.
3. No award.

Class 48.—1 lb. of Spinach.

1. John Kerr, Esq.
2. H. Partridge, Esq.
3. No award.

Class 49.—3 dishes of Tomatoes, distinct (6 fruits of each).

First Prize, 10s. ; Second, 7s. ; Third, 4s.

1. Lord Aldenham.
2. The Earl of Wilton.
3. John Kerr, Esq.

Class 50.—1 dish of Tomatoes, distinct (6 fruits).

1. The Earl of Carnarvon.
2. Walpole Greenwell, Esq.
3. A. A. Cadman, Esq., Thorington.

Class 51.—6 Turnips, white fleshed, round.

1. John Kerr, Esq.
2. J. Rushbrook, Esq.
3. Earl Spencer.

Class 52.—6 Turnips, yellow-fleshed.

1. Lord Aldenham.
2. } No award.
3. }

Class 53.—2 Vegetable Marrows.

1. Lord Aldenham.
2. } No award.
3. }

Class 54.—Collection of 9 Saladings, distinct.

First Prize, 10s. ; Second, 7s. ; Third, 4s.

1. Lord Aldenham.
2. } No award.
3. }

Class 55.—Collection of Pot-herbs, in bunches.

1. Lord Aldenham.
2. H. Partridge, Esq.
3. No award.

Class 56.—Any Vegetable not mentioned above.

1. Lord Aldenham.
2. John Kerr, Esq.
3. No award.

GENERAL MEETING.

NOVEMBER 7, 1905.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H. (President of the Society), in the Chair.

Fellows elected (15).—Wallace Adams, Mrs. Arnhold, Major-Gen. H. P. Bishop, James Child, Mrs. Littleton Dewhurst, R. P. Gregory, M.A., R. H. Lock, M.A., F. Paget Norbury, Miss M. S. Robertson, Gerald O. Sherrard, J. Gordon Spencer, B.A., Joseph Tilley, Frank Walkinshaw, Dr. Samuel West, Alfred Willett.

Fellow resident abroad (1).—W. Leckie-Ewing (S. Africa).

Society affiliated (1).—Harrow and Roxeth Allotment Society.

A lecture on "Chemistry in its Relation to Horticulture" was given by Dr. J. A. Voelcker, M.A. (see page 102).

GENERAL MEETING.

NOVEMBER 21, 1905.

Mr. GEORGE BUNYARD, V.M.H., in the Chair.

Fellows elected (28).—Miss E. Beatson, William Bennett, Mrs. Booth, Miss Ada Bouch, Miss Byass, H. Clendon, Miss J. Farquhar, Mrs. Douglas Graham, H. J. Hughes, Thomas Iremonger, Thomas Lambert, G. Mellors, Mrs. Mundy, Mrs. H. Norman, Lady Ela Russell, Donald M. Scott, Mrs. A. M. Shrubbs, Samuel Stewart, Lady Mary Turner, Viscount Valletort, Dr. Ernest W. White, E. Wordsley, Miss Louisa Wright.

Fellows resident abroad (2).—D. MacGregor (China), Dr. E. M. Modi (India).

A paper on "Hollies," by Mr. E. T. Cook, was read by the Assistant-Secretary (see p. 118).

GENERAL MEETING.

DECEMBER 5, 1905.

Mr. GEORGE GORDON, V.M.H., in the Chair.

Fellows elected (20).—Miss M. Adam, Dr. Boughton Addy, Mrs. Gibson Black, Miss Alice Blois, Miss Cecily Blois, W. Brewer, Harold Leslie Broad, Mrs. A. W. Craig, Samuel J. Elyard, Miss Mabel Faithfull, William Hope, Mrs. Campbell Johnston, Miss Lucas, Miss Mansfield, A. Whiting Pollard, John Speer, Henry Trengrouse, Henry M. Veitch, Mrs. Worsley, G. A. Wright.

A lecture on the "Crystallisation of Fruit and Flowers" was given by Mr. C. Hermann Senn (see vol. xxx. p. 161).

SHOW OF COLONIAL-GROWN FRUIT AND OF HOME-PRESERVED FRUIT AND VEGETABLES.

DECEMBER 5 AND 6, 1905.

JUDGES OF COLONIAL-GROWN FRUIT.

Bunyard, George, V.M.H.
 Butt, George F.
 Fielder, C. R.
 Garcia, M. J.

Hudson, James, V.M.H.
 Monro, George, V.M.H.
 Pearson, A. H.
 Walker, A. M.

JUDGES OF HOME-PRESERVED FRUITS AND VEGETABLES.

North, M. Emile

Pink, Sir Thomas

Wilks, Rev. W., M.A.

DIVISIONS I. AND II.

*Colonial-grown Fruit, Vegetables, Preserved Fruits, Jams, &c.**Gold Medal.*

The Province of British Columbia, for collection of Apples.

Silver-gilt Knightian Medal.

Messrs. J. Philip & Co., 4 Fenchurch Buildings, E.C., for collection of tropical fruits, &c.

The Royal Mail Steam Packet Co., 18 Moorgate Street, E.C., for collection of tropical fruits.

J. C. Gartrell, Esq., Trout Creek, British Columbia, for collection of Apples.

T. W. Stirling, Esq., Kelowna, B.C., for collection of Apples.

The Coldstream Estate, Vernon, B.C., for collection of Apples.

Silver Knightian Medal.

The British West India Fruit Co., for collection of tropical fruits.

J. R. Brown, Esq., Summerland, B.C., for collection of Apples.

Thomas G. Earl, Esq., Lytton, B.C., for collection of Apples.

Mrs. J. Smith, Spence's Bridge, B.C., for collection of Apples.

Agent-General for Nova Scotia, for collection of Apples.

Silver Banksian Medal.

The Hon. J. Cox Fillan, Dominica, West Indies, for Limes.

J. L. Pridham, Esq., Kelowna, B.C., for collection of Apples.

The Kootenay Fruit-growers' Association, Nelson, B.C., for collection of Apples.

The Exhibition Committee of Grenada, for preserved fruits.

DIVISION III.

Home Bottled and Preserved Fruits and Vegetables.

Dried or bottled Fruits and Vegetables of any kind may be shown, subject to the condition of their being tested by the Judges, and provided that they have been grown in the British Islands. Tomatoes may only be exhibited as Vegetables.

Class 25.—Home Bottled British-grown Fruits. *Open.* This exhibit must not occupy a space greater than 10 feet by 8 feet, and must not be built up more than 2½ feet high in the centre. Bottled fruits to be in clear glass. All must be British grown and British prepared.

First Prize, Silver Cup; Second, Silver Banksian Medal.

1. Mrs. W. H. Plowman, Beddington Corner, near Mitcham.
2. Mr. G. Penwill, Totnes, Devon.

Class 26.—18 Bottles of British-grown Fruits (including six different kinds at least), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade (wholesale or retail), but only and entirely for their own household consumption.

First Prize, £8; Second, £2; Third, Silver Banksian Medal.

1. Mrs. Beckett, Elstree, Herts.
2. Mrs. Banks, 102 Park Street, W.
8. Major Hibbert, Ashby St. Ledgers, Rugby.

Class 27.—12 bottles of British-grown Fruits (including four different kinds at least), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade (wholesale or retail), but only and entirely for their own household consumption.

First Prize, £2; Second, £1.

1. Mrs. W. H. Plowman, Beddington Corner, near Mitcham.
2. No award.

Class 28.—Home Dried or Evaporated Fruits. *Open.* This exhibit must not occupy a space greater than 8 feet by 8 feet, and must not be built up more than 2½ feet high in the centre. All must be British grown and prepared.

Medals or other prizes at the discretion of the Council.

No entry.

DIVISION IV.

Class 29.—Home Preserved Vegetables. (Either Bottled or Dried). *Open.* This exhibit must not occupy a space greater than 10 feet by 8 feet, and must not be built up more than 2½ feet high in the centre. All must be British grown and prepared.

Prize, Silver-gilt Knightian Medal.

Messrs. McDoddies, Coventry House, South Place, Finsbury Pavement, E.C.

Class 30.—Home Bottled Vegetables. *Amateurs.* Eight bottles, including four different kinds.

First Prize, £1 10s.; Second, 15s.

No entry.

Class 31.—Home Tinned Vegetables. (8 tins of a kind, 1 to be opened at the Judges' discretion.) *Open*. This exhibit must not occupy a space greater than 8 feet by 6 feet, and must not be built up more than 2½ feet high in the centre. All must be British grown and prepared.

Medals or other Prizes at the discretion of the Council.

No entry.

GENERAL MEETING.

DECEMBER 19, 1905.

Mr. GEORGE BUNYARD, V.M.H., in the Chair.

Fellows elected (22).—Mrs. W. A. Aitkin, A. J. Brandon, W. Briscoe, Thomas Burrows, E. Cobb, Arthur Dye, Miss H. Dalton-Grant, C. S. Griffith, Countess of Ilchester, Mrs. E. E. Irish, W. J. Maltby, Mrs. E. J. Nesbitt, F. Penn, Alfred Biley, Miss K. E. Roscoe, Mrs. A. T. Thring, R. Topping, Henry Whiteley, Mrs. Wilkinson, Mrs. Woodmass, George Woodward, G. F. Yates.

Fellow resident abroad.—Walter Blom (Holland).

Associate (1).—Miss G. M. Hallows.

Society affiliated (1).—Durban and Coast Horticultural Society.

A lecture on "Orchard Management," by Prof. Craig, illustrated by lantern slides, was read by the Assistant Secretary (see vol. xxx. p. 144).

SCIENTIFIC COMMITTEE.

JANUARY 8, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eleven members present.

Henslow Testimonial.—Dr. Masters, F.R.S., reported on the progress made towards the completion of this. The subscriptions, confined to members of the Committee, amount to about £40 at present.

Diseased Carnations.—Mr. Saunders, F.L.S., reported concerning carnation plants that he could find no trace of eelworms or insects present; and Dr. Cooke, V.H.M., wrote: "The plant examined gave no evidence of fungus attack, but the root was completely rotted with moisture. All the mischief evidently arose from mistakes in cultivation, and this is sufficient to account for the result."

Fungus on Agapanthus Stem.—Dr. Cooke reported on the specimens which were brought by Mr. Worsley: "The black elliptical and elongated spots on the dead stems are merely indications of the common saprophytic mould, *Cladosporium herbarum*. Being kept in a damp atmosphere for two or three days, every spot was velvety with the threads and covered with the spores."

Oranges Attacked by Scale.—Respecting the oranges from Seville badly attacked by scale, Dr. Cooke reported: "There was not the slightest trace of *Fumago* or *Capnodium*, or even of fungus or fungus mycelium of any kind, except *Penicillium glaucum*, which soon made its appearance and produced a plentiful crop."

Pear Diseased.—Mr. Shea showed a pear which had several brown decayed spots in the flesh, but seemed quite normal externally. Dr. Cooke undertook to report upon it at the next meeting.

Spots on Phyllocactus.—Diseased specimens of *Phyllocactus* shown by Mr. Worsley were referred to Mr. Saunders and Dr. Cooke.

Germination of Sechium edule.—Mr. Odell showed specimens of the curious fruits of this plant, known as the 'Chaco' or 'Chocho,' containing germinating seeds. The plant belongs to the *Cucurbitaceæ*, and the fruit is a 'pepo,' containing only one seed. The seed germinates within the pepo, and is inseparable from it. Numerous roots are produced on germination, and the stem grows out through the fruit wall, which subsequently becomes woody, while the cotyledons remain behind in the fruit. Some discussion took place as to the fate of the radicle, which appears to be of very limited growth. The fruit is used like the marrow in the West Indies and in the United States of America.

Big Bud in Hazel.—Buds of the hazel attacked by the bud-mite were referred to Mr. Saunders, who undertook to report upon them.

Plant for Naming.—Mr. J. R. Baker, of West End, Southampton, sent some branches under the name of *Thuya Lobbii*. This naming was confirmed by Dr. Masters, *T. Lobbii* and *T. gigantea* being garden names for the true *T. plicata*.

Diseased Beech.—Mr. D'Ombraïn sent specimens, which Dr. Cooke kindly undertook to examine and report upon.

Variety of Douglas Fir.—Dr. Masters showed a curious short-leaved form of the Douglas fir which came up among a batch of seedlings in Holland. It was at first thought to be a hybrid of that species with *Tsuga Sieboldii*, but a transverse section of the leaf at once showed it to be a true Douglas fir.

SCIENTIFIC COMMITTEE, JANUARY 24, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and twelve members present.

Henslow Testimonial.—Dr. Masters reported on this, and announced that the presentation would be made at a meeting of the Scientific Committee in March.

Big Bud in Hazel.—Mr. Saunders, F.L.S., reported upon this as follows: "The hazel buds are certainly attacked by mites, which very much resemble the black currant bud mite both in appearance and in their manner of life, but according to Dr. A. Nalepa, the great authority on these creatures, they are different species. If he is correct, the mites from the nut bush would probably not attack the currant bushes. The species attacking the hazel is *Eriophyes avellanæ*, the other is *E. ribis*. The study of this genus of mites is very difficult, as the mites are quite invisible to the naked eye; consequently the mounting of specimens for examination under the microscope is by no means an easy task. These mites attack plants in a great variety of ways, some attacking the buds, others the leaves, forming blisters on them, as in the case of the 'Pear-leaf blister mite,' or curling the edges of the leaves, like the species which attacks the hawthorn, or forming the galls like little coral beads on the upper side of the leaves of the maple, or the curious 'nail-galls' on the leaves of the lime. If the nut-bushes are badly attacked, I should certainly root them up and burn them; otherwise cut out the infested shoots and burn them, keeping a good look-out for further infestation, which should be at once treated in the same manner." Mr. Michael, F.L.S., remarked that it was extremely unlikely that the same species of mite would attack plants so widely different as the hazel and the currant, although species are known that attack more than one plant. Mr. Gordon, V.M.H., stated that he had seen hazel growing near black currants attacked by the bud-mite, while that in other parts of the same garden was free; but this might have been because the conditions were favourable for both kinds of mite.

Spots on Phyllocactus.—Dr. Cooke, V.M.H., reported as follows on this: "The dark convex spots near the edges of the leaves were hard and somewhat resembled 'sclerotia,' but no mycelium or spawn could be found, nor anything which could be construed into a fungoid structure. What the dark bodies are must still remain as a 'puzzle for the curious.'"

Branch of Ash Fasciated.—Mr. Odell showed a specimen of this common growth, cut from the tree ten feet above the ground.

Slime-fungus on Walnut.—Mr. Davidson sent a walnut having the fungus *Phycomyces nitens* growing upon it.

Mite on Bark of Apple.—Mr. Griggs sent a piece of apple-bark infested with the mite *Oribata lapidaria*. The mite is frequent upon the bark of apple-trees, but causes no injury to them.

Disease of Beech-trees.—Dr. Cooke reported upon the specimens sent to the last meeting, on which the common fungus *Tubercularia vulgaris* was growing. The stumps growing near by had another fungus, *Xylaria hyporylon*, upon them.

Pear, Diseased.—The decay in the pear brought to the last meeting by Mr. Shea, which appeared as brown spots in the flesh, nothing being visible on the outside, Dr. Cooke attributed to the fungus which caused the "brown rot" of fruit, and to which the black apple recently exhibited also probably owed its peculiar appearance.

Gall on Eucalyptus occidentalis.—Mr. Holmes, F.L.S., showed specimens of this on bark known commercially as mallet-bark. A large quantity is being imported from Australia for tanning purposes. Mr. Saunders took the specimen to examine further.

Spraying Apparatus.—Mr. Holmes also showed a simple form of spraying apparatus which is shortly to be put-upon the market.

Spirits of Tar for Wounds on Trees.—Mr. Hooper asked whether this might be used, and both Mr. Gordon and Mr. Shea spoke of excellent results arising from its use.

Cyclamen Leaves Discoloured.—Dr. Cooke reported that the rusty spots on cyclamen leaves received from Stevenage showed no sign of fungus. It was suggested that the injury was probably caused by a mite similar to, if not identical with, the begonia-mite.

SCIENTIFIC COMMITTEE, FEBRUARY 14, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eleven members present.

Apples Rotting.—Mrs. Lee sent some apples which appeared sound externally, but on being cut were found to be rotten. Dr. Cooke, V.M.H., reported upon these as follows:—"There is every reason to believe that the apples are affected with 'brown rot,' caused by *Monilia fructigena*, which has been more common than usual this winter. It is a fungous disease, although the fungus is not yet fully developed in the apple sent. It is capable of passing on to healthy apples in storage, hence all diseased fruits should be removed and destroyed as soon as the disease appears. The same disease attacks apples, pears, cherries, apricots, and almost all pulpy fruits, reducing them to a brown rot."

Worm-eating Slug.—Mr. Saunders, F.L.S., showed a specimen of the shell-bearing slug, *Testacella haliotidea*, which subsists on earthworms, and consequently spends most of its time in the ground.

A New Greenhouse Pest.—Mr. Chittenden showed a number of specimens of a cockroach, *Leucophaea surinamensis*, in all stages of development. The species, which is widely distributed in the tropics, has been found only two or three times in England, and was not until now known to breed here. It was recently found in great numbers in tan at

Broomfield Lodge, Chelmsford, and appears to be particularly injurious to orchids.

'Navel' Oranges.—Mr. Chittenden showed a specimen of this well-known form of orange. All the larger fruits on some trees of the variety 'Sustain,' grown at Widford Lodge, Chelmsford, had sported in this peculiar way, while the smaller fruits were of the normal form.

Old Age in Plants.—A letter on this subject was received from Mr. C. B. Luffmann, Victoria, Australia, the consideration of which was deferred till the next meeting.

Fungus on Tree Roots.—Mr. Sharp, of Westbury, sent a specimen of a fungus growing on the roots of a tree by a brook, which Dr. Cooke determined to be *Peziza coccinea*.

SCIENTIFIC COMMITTEE, FEBRUARY 28, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and twelve members present.

Old Age in Plants.—A letter was read upon this subject from Mr. C. B. Luffmann, Victoria, Australia, who pointed out that many vegetatively propagated plants were dying out, owing to what he designated as a "prepotent tendency" and a diminishing food supply. It was decided to discuss the question, with reference especially to the potato, at the meeting on March 28.

Henslow Testimonial.—Dr. Masters announced that the testimonial would be presented to Prof. Henslow at the meeting of the Scientific Committee on March 14.

Snowdrop "Sport."—A variety of the common snowdrop, which had persisted in the same soil for ten years, was sent by Mr. J. M. Rawson. Mr. Bowles recognised it as *Galanthus nivalis* var. *poculiformis*, Hort.

Daffodil Poisoning.—Mr. J. Lowe wrote stating that the gatherers of daffodils often suffered from sore hands, and requesting some information as to a remedy. Mr. J. Walker wrote stating that usually only those who had chapped hands, or who failed to wash their hands after picking the flowers, suffered from the trouble. The Committee were of opinion that the crystals of calcium oxalate (raphides), which are frequently abundant in this and similar plants, were the cause of the trouble, and it was suggested that the workers should thoroughly grease their hands with tallow before picking the flowers, or should wear gloves.

Cyrtanthus lutescens.—Mr. Worsley showed a colour variety of this plant.

Decayed Crinum Bulbs.—Mr. Worsley also brought some decayed bulbs of *Crinum*, and described some of the organisms found in them. Mr. Saunders undertook to report upon them.

Insects Injuring Pine Shoots.—Mr. Wills wrote requesting information about a grub, *Retinia buoliana*, which bored into shoots of pine and caused their destruction. This was referred to Mr. Saunders.

Leaves Decaying at Tip.—*Croton* and *Dracena* leaves were received which were apparently injured through adverse atmospheric conditions, and a leaf of *Asplenium nidus-avis* malformed at tip, probably through injury in its early stages.

Malformed Mushrooms.—Dr. Masters showed specimens of very irregularly formed mushrooms, which Mr. Massee reported to be attacked by a mould, *Hypomyces* (sp.). All such should be destroyed.

Laurel Leaves, Diseased.—Dr. Masters also showed specimens of laurel leaves with blisters upon them. Mr. Massee undertook to report upon them.

SCIENTIFIC COMMITTEE, MARCH 14, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and twenty members present.

Henslow Testimonial.—Dr. Masters, on behalf of the Committee, after referring to the great interest Prof. Henslow had always taken in the work of this Committee, and after expressing the great regret felt by all on his resignation, presented him with a silver tea and coffee service, bearing the following inscription:—"Presented to Rev. Prof. G. Henslow, M.A., V.M.H., by the members of the Scientific Committee of the Royal Horticultural Society, in grateful remembrance of his valuable services as secretary, and as a token of friendly association during a period of twenty-five years." Prof. Henslow, in replying, referred briefly to the history of the Committee, with which he had been associated for a quarter of a century, and thanked its members for the support they had always afforded him, and for the mark of their regard with which they had presented him that day.

Pine-bud Moth.—In reply to a request for information concerning this, Mr. Saunders, F.L.S., reported as follows:—"The shoots of Scotch fir are attacked by the caterpillars of a small moth belonging to the genus *Retinia*, which contains several species whose caterpillars live in the shoots of firs; the commonest species is *R. buoliana*. When by the appearance of a shoot it is suspected that there is a caterpillar within, it is best to cut it off and burn it. In July, if a number of yellowish-red moths, measuring about an inch across the open wings, appear, it might be worth while to catch them in a butterfly net."

Injured Crinum Bulbs.—Mr. Saunders also reported:—"The bulbs were attacked by dipterous larvæ, probably *Lonchæa vaginalis*, in large numbers, by the 'bulb-mite' *Rhizoglyphus echinopus*, of which there was one large colony, and by one of the 'springtails,' *Lipura ambulans*. It is difficult to say which of these pests began the work of destruction. The grubs of the fly would no doubt be more destructive than the others. The centipedes which were found were probably *Lithobius forficatus*, which I believe to feed entirely on animal food; they were probably feeding on one or more of the pests." A vote of thanks was accorded to Mr. Saunders.

Hybrid Orchid.—Mr. H. Veitch showed an interesting bigeneric hybrid, now flowering for the first time, *Dialœlia Veitchi* ×, between *Diacrium bicornutum* and *Lœlia cinnabarina*, which showed clear evidence of the influence of both parents. A Botanical Certificate, proposed by Dr. Masters and seconded by Mr. Elwes, was unanimously awarded.

Scientific Research at Wisley.—The Rev. W. Wilks announced that some experiments had already been commenced in the gardens under the

direction of Mr. G. Massee, V.M.H., who had kindly undertaken to superintend them. The experiments are :—(1) To ascertain whether the black-currant bud mite can infect the hazel and *vice versa* ; and (2) to discover what is the effect on germination of soaking seeds in various solutions.

Formation of Fruit-buds.—A communication concerning the date at which blossom-buds were first formed on fruit trees, and the conditions influencing their formation, was received from Mr. J. Dunlop, F.R.H.S. After some discussion, in which the Chairman, Prof. Henslow, Rev. W. Wilks, Mr. Baker, and others took part, the matter was referred to the Secretary.

Daffodil Poisoning.—Referring to this matter, which came up at the last meeting, Mr. Saunders said it seemed probable that the crystals of calcium oxalate in the leaves acted as inoculation points, causing a small wound which allowed the entrance of the poisonous substance which is known to occur in the leaves.

Disease of Cucumbers.—Mr. Hans Güssow showed drawings and cultures of a fungus causing disease in cucumbers. The young fruits are covered with a velvety growth of blackish-green fungal filaments, and it is reported by Prof. Mazé that the leaves also are attacked, forming spots similar to those produced by *Cercospora melonis*, Cke. ; the spores, however, of the fungus are quite different. Mr. Güssow proposes the name *Corynespora Mazei* for this fungus, establishing a new genus and species (see "Journal of the Royal Agricultural Society," vol. 65 (1904), pp. 270–272, figs.). Mr. Massee and Dr. Cooke both stated that the disease was well known in this country, that the fungus was probably the conidial stage of a higher fungus, placed by British mycologists in the genus *Alternaria*.

Scale Insects.—Mr. Walker showed specimens of a scale insect which had occurred outdoors on the following shrubs ; *Escallonia macrantha*, *Trachelospermum jasminoides*, and *Crataegus Pyracantha*. Mr. Newstead, who determined the insect to be *Lecanium hesperidum*, stated in a letter that the insect was very rarely met with outdoors, though known in green-houses.

Effect of Hail.—Mr. G. Woodward, F.R.H.S., of Maidstone, sent branches of fruit-trees showing large, partly healed wounds, many of them 2 inches in length by 1 inch in width, caused by the hailstorm which occurred three-and-a-half years since.

Capnodium on Oranges.—Leaves of oranges almost covered with *Capnodium* were received from Lisbon from Lady Denison-Pender. This fungus lives on the honeydew secreted by aphides, &c., and may be checked by killing the insects as soon as they appear by spraying with a resin wash.

'Stag's Horn' Ash.—Mr. Burbidge, V.M.H., sent specimens of contorted and fasciated twigs of this curious and little known variety of ash. "The tree," says Mr. Burbidge, "is propagated by grafting on the common ash as a stock. It forms a low-spreading tree 15 to 25 feet in height, and as the tip or apex of every twig is contorted and fasciated it is very peculiar-looking when its leaves fall in autumn and winter. There is a very good example of this 'stag's horn' variety on the lawn at Kilmacurragh, co. Wicklow."

SCIENTIFIC COMMITTEE, MARCH 28, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, with seventeen members present, and Messrs. L. Sutton, A. Dean, and Foster, visitors.

Diseased Amaryllis Bulbs.—The bulbs sent to the last meeting by Mr. C. E. Baxter, F.R.H.S., had unhealthy roots marked at their base by a deep red colour, which penetrated right through the root; the red colour in places stained the outer scales of the bulb, and was visible also on the tips of the young leaves, which were hardly an inch in length. Mr. Saunders, F.L.S., reported that no mites or other living creatures were present on or in the bulbs. Dr. Cooke, V.M.H., wrote:—"The dark blotch was caused by a fungus, *Botrytis cinerea*, apparently the same as described by Professor Marshall Ward on the lily. The bulb has been kept in a damp atmosphere for ten days, and has now a fine crop of the mould. Nothing can save a bulb when once attacked."

Galls on Spruce Fir.—Mr. Saunders reported as follows:—"The shoots had been attacked by one of the aphides, *Chermes abietis*. The female lays her eggs in the spring at the base of the buds, which she punctures with her proboscis and feeds on the juices; the young *Chermes* which are hatched from these eggs feed in the same manner. The continued puncturing of the bud causes the leaves to grow in a quite abnormal manner, the result of which is a gall which very much resembles a small fir-cone. The young insects are gradually quite enclosed in the chambers of the gall. Eventually the chambers open, and the *Chermes*, which have by this time become winged, fly away. Though this insect is so common, its life-history has not yet been completely made out. In the early summer these galls should be cut off and burnt, so as to destroy them before their tenants escape."

Diseased Spanish Iris.—Plants of several varieties of Spanish iris were sent to the last meeting, with the note that some had failed to start; some had germinated and grown to some extent, but had then gone off. Dr. Cooke examined them and reported:—"After being kept in a damp atmosphere for nearly a fortnight the bulbs exhibit no fungus pest. The bulbs are rotting, and with plenty of the bulb-mite in them, to which their failure must be due." Mr. Massee also writes:—"I can find nothing else for it but to attribute the injury to the bulb-mite."

Diseased Richardia.—Mr. W. G. Soper, F.R.H.S., sent some diseased Richardias. The plants grown in his garden had suffered more or less for five years, and dusting the corms with flowers-of-sulphur and soaking them in Bordeaux mixture had had no effect on the disease. Mr. Odell kindly undertook to examine and to report upon them at the next meeting.

Pear Twigs Diseased.—These, from the National Fruit Growers' Federation, exhibited the well-known signs of canker.

Crinum Rattrayi.—Mr. Worsley drew attention to the plant exhibited at the show to-day, and stated that it varied very little from *Crinum giganteum*. Mr. Nicholson said he had no doubt it was a form of that plant.

Degeneration of Varieties Propagated by Buds.—A discussion on this

subject then ensued, opened by following introductory remarks by Dr. Masters :—

“Nothing is more certain than that individuals when no longer in harmony with their surroundings disappear. In the struggle for existence and in the competition with other individuals, the one least well adapted to sustain the onslaught succumbs, or, as the old adage has it, the weakest goes to the wall. What is true of individuals must be true of species, which are collections of individuals, and must be equally certain in regard to varieties. But let us suppose that the conditions remain favourable, that no one individual dominates over another, then the balance is maintained—individuals, varieties, species remain as they were.

“Although these are truisms, yet every now and again the question is raised—Do varieties degenerate ?

“Under cultivation every effort is made to maintain the favourable conditions unimpaired, to secure the permanence of the variety, to afford it preferential treatment, and to protect it not only from adverse conditions but from internecine competition.

“Hence it is that, on the one hand, certain varieties, such as the ‘Black Hamburg’ grape, the ‘Admiral Curzon’ and ‘Sportsman’ carnations, the ‘Ashleaf’ or the ‘Beauty of Hebron’ potatoes, still retain so much of their pre-eminence that they have not been displaced or supplanted by newer comers.

“On the other hand, many varieties appear, have but a short career, and then disappear. Not one of the five hundred varieties of carnations mentioned in Thomas Hogg’s catalogue is now in existence, according to Mr. Douglas.

“Now, what we want to know is whether a wearing-out process really occurs, independently of external agencies ; whether the so-called degeneracy is innate, or whether it is merely apparent, arising from the substitution of some newer variety which is supposed to have, or really does possess, superior qualities.

“These are the questions which are to be discussed at this meeting, and in order to give point to the discussion, and to obviate discursiveness, it is judged advisable to confine the discussion, so far as possible, to the question whether varieties propagated by vegetative methods do deteriorate independently of external conditions, and, if so, why ? For convenience sake, and because potatoes loom largely in the public mind at this time, the illustrations are confined as nearly as might be to the potato. In other words, Do varieties of potatoes raised from sets and subject to unaltered conditions deteriorate, and, if so, why ? ”

Mr. A. DEAN then read a short paper on the subject of deterioration, with special reference to the potato :—

DO POTATO STOCKS DETERIORATE ?

In dealing with the assumed deterioration of the potato, it is needful to be clear that potatoes as edible products are not referred to, but as varieties of a species. The assumption is that varieties of potatoes have comparatively short lives, compared with other kinds of vegetables. That assumption is by no means proved. One probable cause for the

comparatively rapid disappearance of potato varieties from cultivation is the freedom with which new ones are raised, and the taste for novelties is as great among potato-growers as among any class of persons. That readiness for change is based on a belief that new ones may always be better than older ones. Curiosity to find what may be the characteristics of new varieties is also a prominent factor in the matter. Then it is again a tradition of the potato trade that varieties wear out, and should often be replaced by newer ones. The trade would no doubt feel hurt were it to be said that such tradition is based on trading interests. In any case it does as a theory without doubt lead to much business.

Now, if we turn to some varieties of potatoes which have been long in cultivation, we find that in their cases wearing out is not so evident. There is the 'Ashleaf Kidney,' in cultivation from almost time immemorial, and chiefly recruited from year to year either by selecting tubers for planting from their best plants, or by effecting frequent changes of seed-tubers. The American 'Beauty of Hebron' has been here some thirty years, and seems to be as useful and good cropping a variety as ever. 'Magnum Bonum' has been with us thirty years, and still it is found that tubers from stocks grown in Denmark give as full crops here how as the variety ever did. 'International Kidney' is still found in all parts of the kingdom, giving as fine crops of tubers as ever, and it is grown in the Channel Islands and in France in enormous quantities for the supply of the British markets. Given varieties that newer ones have failed to displace, and there seems to be no lack of endurance in them—tuberous artichokes in point.

But assuming that the theory of the deterioration of varieties is correct, what may be the predisposing causes to that decay? First, is it not possible that our practice of wintering tubers for future planting in dry places and exposed to air may have a weakening effect? Does Nature require that to be properly progenitive the tuber should remain in the soil all the winter, but preserved from frost? I do not advance this as an absolute necessity; I merely put it forward as a possible cause for the assumed deterioration.

Then we do as a rule—and it is noteworthy that the old 'Ashleaf Kidney' is usually an exception to the rule—plant small rather than large tubers annually for crop production. In the case of other vegetables, do we not select the very finest roots or plants to produce the seed for the ensuing crops? In everything we grow in gardens or fields it is the rule to select for parentage the finest and the best. This is not so with the potato, and if in its case we depart, as we so commonly do, from an acknowledged rule, what other result can be looked for but that gradual weakening or deterioration of stock must ensue? Conversing recently with an old Scotch potato-grower on the cause of the fine productiveness of Scotch tubers, he said that apart from Scotch soil and climate, two important factors in that strength or fertility, it was largely the practice to plant large tubers, even though often cut prior to the planting. On that point it may be possible to get further information. Undoubtedly a common cause for real weakness in potato stocks is found in the storing of tubers for planting in pits, tiers, or heaps, in which they sweat or heat,

thus speedily causing premature sprouting. That is especially an evil practice in the southern districts, because potatoes ripen early, and as a consequence push growth early. That the result is of the most weakening effect has been demonstrated over and over again. Whilst our crops southwards are ripe often from six to eight weeks earlier than are those in the north, we cannot, because of the prevalence of spring frosts, safely plant much earlier than in the north.

Three hundred years of European cultivation have left the potato plant as tender as ever it was, and but one sharp spring frost on the plants may kill them to the ground. All good growers hold that boxing seed tubers and wintering in cool sheds away from frost, and where comparative rest is secured, is invariably followed by finer crops than those obtained from tubers that have been pitted and prematurely sprouted, the blanched sprouts being removed. Is it wise to have potato breadths moulded up, as is commonly done? That it is done chiefly to keep tubers from exposure to light and air is the case, but it still remains a question how far the practice may be detrimental to the robustness of the plant. The method of propagating potatoes by means of sprouts or cuttings taken from tubers forced into premature growth in warmth under glass, not at all a new practice, but one much revived last year, has led to the declaration that it means ruin to the constitution of the potato. Absolute proof that such would be the result has not been furnished, and although it may be out of place further to refer to the practice here, yet before such doctrine is accepted more experiments must be made. To that end it would be well if a series of experiments could be conducted at Wisley on such lines—plants obtained from sprout-cuttings raised and planted out beside others of the same variety raised from ordinarily planted tubers, the progeny in each case being grown on also side by side for three or four years. Also experiments might be conducted to show the effects of whole large tubers and cut large tubers against those of the customary round tubers that are generally planted, so as to ascertain which progeny would, after some three or four years, the soonest deteriorate. The effects of earthing-up and non-earthing could be tried, also the effects of change of seed from various soils and climates as compared with similar varieties home-grown. These and many other allied experiments might well be conducted at Wisley by a special Potato Committee.

Effect of Soils.—Whatever may be the effects of different soils on potato-plant growth, it is certain that they do produce very markedly diverse effects on the quality of potatoes for edible purposes. How far deficiency of starch in a tuber may affect its productive capacity when planted, as compared with the same capacity of a tuber of similar size that is thoroughly starchy, is a matter which experiment and observation alone can prove. It is instructive to find that of the same varieties grown on diverse soils or in diverse localities, whilst some are really good in an edible sense, cooking dry, mealy, and starchy, from other soils the tubers are watery, close, tasteless, and altogether worthless as food. If such be the effect of soils on tubers, may it not be probable that weakening effects would follow in the growth of the plant? Here it is evident the analytical chemist is needed to show in what elements the tubers and the soil may be deficient, and what manures are needed to provide them.

Prof. PERCIVAL said the matter was obviously one of fact, and what was wanted was more evidence. He doubted whether any of those present had lived long enough to settle such a question, especially in the case of long-lived plants such as vines. The idea of deterioration was no doubt widely spread. When they heard, as in the case of the potato, that certain varieties had been in cultivation for a long time, it did not touch the point. A large number of varieties might have died out very much more quickly than others which may have had more vitality. Certain it was that some varieties had disappeared, but why was not quite clear. There was evidence that they got weaker and weaker, and that was why they had been discarded for their pooriness. A hundred years ago—in fact, in the middle of the eighteenth century—there was evidence of very great difficulty in rearing potatoes, which in many cases refused to come above ground. Some such effect was noticed nowadays by growers, and it was no doubt due to a weakening cause. If that were the case, he personally thought it strongly favoured the disappearance of the varieties vegetatively reproduced. To ask why was like asking why old age occurred. We did not know what old age was. Human beings did not live for ever—nor did trees. There seemed to be a distinct life-period for all these things, after which they died down from want of vitality. Everything underwent repair, and he believed the repair was not perfect, and that the life-machinery gradually weakened and vitality was lost. The question would only be settled, if at all, by experiments.

Mr. ODELL stated that, after many years of experiments, he had found that 'Magnum Bonum' grown for four years running on a heavy clay loam in Middlesex was completely worn out, and in two years the produce was reduced by 50 per cent.

Dr. MASTERS: How would it have been on another field?

Mr. ODELL said he could not answer the question. In the case he mentioned it was the same soil, but not the same plot.

Mr. DRUEBY: Would that not imply that the soil was not suitable for potatoes?—and that would be begging the whole question.

Mr. WORSLEY said he got some advertised disease-proof potatoes, but at the end of eight years all the potatoes were diseased.

Mr. DOUGLAS recalled how in his young days they had two deliciously flavoured potatoes, 'Buffs' and 'Dons,' but in 1845 they were practically exterminated. The people then took to the white potato, but they were nothing like the others in quality. It was about that time that guano was introduced, and many farmers thought that was the cause of the disease. He did not know whether there was any truth in that, but he had come to the conclusion that artificial manures favoured the production of disease. In Essex they had potatoes for many years, but the tubers deteriorated. They used to grow 100 acres of potatoes, and it paid to send to Scotland for the seed. Owing to weakness many of the potatoes never ripened, and degeneration soon followed. He could not say what was the cause of the degeneration, unless it was artificial manures.

Mr. FOSTER was of opinion that there was no doubt that potatoes did deteriorate after they had been grown in the same soil for a number of

years. He exhibited largely some years ago, and he found that he could get much better crops from seed planted late than from tubers planted in the usual way in the spring.

Mr. GORDON, V.M.H., remarked that the point for them to consider was how to prevent this degeneration. He thought the case of the potato was wholly different from that of fruit-trees, because so far as he knew no varieties of apples, pears, or plums had degenerated, although they were reproduced vegetatively by grafting. When he was a boy the 'Ribston Pippin' was supposed to be dying out, but now they could see thousands of trees in the country in the most healthy condition, and bearing excellent crops of fruit. They ought to remember that the potato was an exotic, and was grown in this country under conditions very different from those in its native home, and that was a point to which they should, he thought, pay special attention. Then they ought to consider whether their methods of procedure did not contribute to the degeneration. In his early days they used to cultivate the old 'Fluke,' which was supposed to be dying out, but they used to grow some tons per acre more than their neighbours. Their practice was, instead of keeping the potatoes close in clamps until the time for planting, to spread the tubers in cool sheds protected from frosts. Consequently they did not make long growths, which had to be removed, and the tubers were not exhausted to the same extent. They were thus able to grow the potatoes of that particular variety long after the other growers in the district were able to do so at anything like a profit. There was, therefore, a great deal in their methods. The same could be said of chrysanthemums. These had been grown for a large number of years, and the plants retained their original vigour until there was a great demand for blooms of the very biggest possible size. Then the forcing system of cultivation was adopted. This brought about weakness of the plant, and the particular varieties died out in a very few years. As to the potato, if they adopted a different method in selecting and saving the seed-tubers, they might be able to retain the vigour of the varieties longer than was the case at present.

Mr. SHEA stated that Mr. Gordon had anticipated much that he would have said. They were undoubtedly dealing with an exotic which could not under the best conditions live its perfectly ideal life here. Therefore the potato was in a measure slightly on the down-grade. It was not, however, to be assumed that the potato was rapidly disappearing for good. It seemed that Scotland had conditions which could maintain a particular variety in better health than could be done in the South. There was great deterioration in all potatoes, due to climatic alteration. It might be extremely slow, but it would be quicker where the soil did not suit the variety. They could not expect otherwise where their methods produced artificial causes of deterioration which were not inherent in the potato. They aggravated any inherent weakness there might be by transplanting the plant to strange conditions; and then they found that when new varieties were excessively "boomed" it led to their being introduced to places which were not fit for them, thus encouraging the idea that there was deterioration.

Mr. BAKER said he had done very well with potato seed which he got

from Scotland, but the second year's crop was best. After the second year, however, rapid deterioration set in. He had found that if the Scotch seeds were put in thoroughly worked soil with plenty of minerals, but which was deficient in nitrates, he got a good crop. He had planted 'Snowdrops' on poor soil in which nitrogen was very deficient, and they had never yet fallen victims to disease. Under these conditions he had obtained better crops than from potatoes grown in richer soils. That was also true of the chrysanthemum, or any plant. In the case of the apple, which was not forced to the extent that vegetables were, they did not get deterioration of varieties. That was why the strawberry did not deteriorate to the same extent as the potato. The reason was that the grower realised that he must have abundance of minerals and not too rich soil. In other words, he believed that abundance of nitrogenous plant-food caused rapid deterioration by altering the cell-structure.

Mr. DEAN, supplementing his paper, said deterioration resulted from planting small tubers. Large tubers should be planted, as that, he believed, was one of the primary causes of the Scotch seed giving such good results.

Mr. WORSLEY added that when he said he had produced potatoes on land for eight years he should have stated that he selected large tubers. That was no doubt the reason why he succeeded in growing them well for eight years.

Mr. CHITTENDEN said it was the common practice in Essex to get seed from Scotland. He had been informed that it was necessary to change from one district to another. It was not necessary to make a big change in the climate, though that would probably follow there, he thought, from the "lay" of the land.

SCIENTIFIC COMMITTEE, APRIL 11, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eleven members present.

Deterioration of Vegetatively Reproduced Varieties.—The following letters upon this subject from several gentlemen were read, mostly pointing to the conclusion that varieties do deteriorate :—

Mr. BURBIDGE : This is a wide question and has been discussed ever since the late Thos. Andrew Knight wrote his *Treatise on the Apple and Pear* in 1797. It was, I believe, Knight's first book, a small octavo, and is now rather rare. It is a common belief amongst gardeners that varieties do deteriorate or "go back" in gardens. This I myself do not believe is true if they are well, wisely, and properly cultivated. Deterioration is very often, even if not always, the result of bad culture, senility, or neglect. It is, moreover, due in many cases to growing the same variety too long on the same soil, and to the use of too much manure. With potatoes this is especially the case ; but no potato as a variety deteriorates on good soils if the seed or sets are changed, or obtained from a different soil and climate every year. The old 'Ashleaf Kidney' potato is as old as most potatoes, and is still one of the best. The craze for novelty and competition in the trade often lead to good old varieties being superseded by new seedlings or selections, or by old kinds

of known excellence being again sent out under new names. Varieties may deteriorate locally, *i.e.* when badly grown on unsuitable soils or under adverse conditions, but no one can prove that varieties like the 'Black Hamburg' grape, 'Royal George' peach, 'Moor Park' apricot, 'Ne Plus Ultra' pea, 'General Jacqueminot' rose, 'Old Clove' carnation, ever deteriorate as varieties all over the area of their cultivation. Did anyone ever hear of any variety of banana, pineapple, or seedless grape wearing out? Do osier willows ever wear out? Varieties may be neglected and weakened by being planted too constantly on the same soil or in unsuitable localities; they may also be renamed or superseded by novel kinds being "boomed" over their heads, so to say; but no variety fairly well grown on fresh and suitable soil ever dies out. No one variety grows or is as productive on all soils alike; but the best varieties are very adaptive, and their produce averages well on all soils.

Most of the figs, mulberries, and grapes grown to-day are practically those known for centuries. Brown Turkey or white Ischia figs, the Zante currant grape, black Monukka grape, bananas, pineapples, and other seedless fruits increased vegetatively are as healthy and productive to-day as they ever have been. Of course, the words "a variety" often mean that we are dealing with a group of distinct individuals, and not with a multitude of individuals precisely alike. Good culture, continual change of soil, and rigid selection are all necessary to keep at their best "varieties" so called, and under such conditions I do not admit that the deterioration or wearing out of varieties ever takes place either in gardens or in the fields. In Professor Hugo De Vries' work *Species and Varieties: Their Origin by Mutation*, in which book some aspects of this subject are ably dealt with, it is shown that any crop of either corn or roots consists of individuals of varying vitality or productiveness. This makes selection possible. There are certain individuals in every crop, as in every flock or herd, that can either utilise more food than others, or that in any case are more productive than are others under the same conditions. The simple art of selection enables the gardener or farmer to improve the best varieties or strains by continual selection. Some individuals in any variety or strain may show a retrograde tendency, and these are eliminated, so as to give added opportunity to the best and most productive individuals, and in this manner the variety is improved and its life insured. In a word, varieties are constant or ever improving only under the best conditions of cultivation. By the same token they will deteriorate only if neglected and grown under bad conditions.

Mr. CLARKE: It is a fact that the potato does deteriorate. It is not wise to grow the same stock for more than two years. We find in this district that the further north we get our seed from, the better it is. It is generally considered that the second year's crop gives the best results, but at any rate it is not wise to grow the same variety more than two years on one farm. I should not say that after being grown, say, here two years and then moved some miles away, it would increase in vigour. It might probably grow as well for two seasons and then it would be exhausted. It is a good change from this country on to the black soils, but it will not do to change thence back again, and I think that where the tubers

have been grown on black land the better plan is to use the seed for cattle or pigs and get a fresh stock. My experience is that the worn-out stocks take the disease more quickly than others. I am afraid that we shall find that the newer varieties are very tender. I am still a great believer in the spray when properly applied. I think I was one of the first to take it up, and I well remember the opposition encountered. I was in Bedfordshire, just teaching them the way to employ the spray—I think in 1894—when an old gentleman came up to me and said, “Mr. Clarke, I think you are trifling with Providence.” That was one instance. Now spraying is general, but it is not half done—hence a good deal of disappointment.

Mr. FRASER: It has always been considered good practice in this district to change “seed” potatoes after a few years, getting seed from a different class of soil, if not from another locality. Soil seems to have as much to do with degeneration as climate, or more, and round here we have a great variety of soils—clay that in some seasons is almost unworkable, various gradations and combinations of loam, sand, and gravel, besides black, mouldy soils and peaty soils. We have also in this small county (Elgin) wide differences of climate and rainfall. Thus, without going far from home, we can have a decided change of locality. It is considered desirable to get seed from a higher district, which means a moister as well as a colder and later climate. Thus we had ‘British Queen’ from an up-country farm, say 600 feet above sea-level, planted last season on light gravelly soil on this farm at between 80 and 90 feet. The variety did exceptionally well, but it was from a good farm and was a fine sample to begin with. Potatoes from a dry soil are not looked on with favour for “seed,” and in the case of such soils it seems to be necessary to change frequently, every two or three years at least, otherwise the leaves grow curly and stunted, and the plant does not properly develop.

Seed from Ross-shire has been found to do well in Morayshire, but so also has seed from Forfarshire. Ross-shire has a considerably moister climate than Morayshire, but not much colder, if at all, at the same elevation. The soil of Ross-shire is, I should think, the richer in general. Forfarshire is agriculturally one of the finest counties in Scotland.

Certain varieties of potatoes seem more liable to degenerate than others. A gardener of some experience tells me that he has grown ‘Snowdrop’ (or ‘Snowflake’ perhaps he meant) for ten years, and that he has them still as good as at first.

As a matter of common experience, potatoes seem to degenerate by continuous planting in the same class of soil, but there may be contributory causes, such as selecting “seed” from the dressings of the marketed potatoes. I heard just lately of a farmer near here who has stuck to the same stock for I do not know how many years—say, fifteen to twenty—with the result that his potatoes are now like “marbles,” and this on one of the finest farms in the county.

The ‘Victoria,’ which became common in this district in the seventies, when the varieties formerly grown suffered badly from disease, was very successful for a number of years, but degenerated in time both as a cropper and in disease-resisting power, and has long been out of cultivation. The ‘Magnum Bonum,’ which was introduced somewhat later, so

far as I remember, kept up better as a cropper, and continued comparatively free from disease, but it was never a favourite on the table at home unless for use in spring, not being "dry" enough. It sold comparatively well, probably on account of its shape and keeping qualities. The 'Bruce' took the place of the 'Magnum,' being somewhat similar in character, but I do not think it was ever so good a cropper, and it has now given place to newer varieties. The 'Up-to-Date' seems to have something of the character of these last two, and does not appear to have degenerated yet.

As to whether a variety which had lost some of its vigour would regain it by being transferred from the South of England to Scotland, I do not know of the experiment having been tried. I should think there is at least a probability of improvement if soil and locality be properly chosen. The duration of a variety depends largely on its power to resist disease and its place on the market, along with its capabilities as a cropper. For disease-resisting power it has been found necessary from time to time to obtain new varieties, and when new varieties have found favour on the market, they have naturally displaced the old on that account alone.

Prof. HENSLOW: Whether potatoes "deteriorate" in value is a question for the trade; but that they vary according to the soil and climate of the localities where a particular variety is grown is well established. Prof. Bailey has given a good example in the case of the 'Newtown Pippin' (*The Survival of the Unlike*, p. 99): "It originated upon Long Island, N.Y., and has been widely disseminated by grafting. In Virginia it has varied into a form known as 'Albemarle Pippin,' and a New York apple exporter tells me that it is a poorer shipper than the northern 'Newtown,' and is not so long-keeping. In the extreme north-western States . . . it is markedly unlike the eastern fruit. . . . In New South Wales it is called the 'Five-crowned Pippin,' " &c. Conversely with the Chilian strawberry: "Within two years this plant, growing in my garden, varied from its wild type so widely as to be indistinguishable from the common garden strawberry . . . an instructive case of sexless evolution." Professor Bailey then adds: "Any plant which is widely distributed by man by means of cuttings or other vegetative parts may be expected to vary in the same manner."

The above seems to me to answer the question. In many cases, by departing from the typical characters, the variety might be said to "deteriorate"; but there is also the chance of its acquiring something new, which might balance its value. There does not appear to be any evidence of a variety "dying out" in any other sense.

Prof. SCOTT-ELLIOT: There are two cases in which there is distinct evidence of deterioration in vegetatively reproduced plants. First, the sugar-cane, which has until the last few years been invariably propagated by non-sexual methods. Its culture dates back to a period so distant that the priests in India had had time to produce an "observed" law—viz. that "if any cultivator saw a cane in flower he would die within the year, his house would be reduced to beggary, and his entire fortune be destroyed." The cultivation has been carried on in very distant parts of the earth, under totally distinct methods, and in widely varying conditions

of soil, climate, and exposure. Yet deterioration has been complained of in every part where its cultivation is of importance. And the West Indian Agricultural Conference of 1905 seems to agree that it is to be remedied by using seedling canes.

Another example is the Canadian weed *Elodea canadensis*, which escaped from a botanical garden in Germany, and at once spread, by vegetative reproduction only, all over temperate Europe. For many years it was a curse to all canals, ponds, lakes, &c., and involved very expensive cleaning; but of recent years, though it is by no means extinct, it is certainly not so serious an evil. In small enclosed ponds, after having been a perfect pest for some years, it suddenly begins to dwindle and may almost totally disappear. A case of this sort came under my own observation in a small pond at the Glasgow Botanical Gardens, where it is now almost extinct, though some five or six years ago it choked the whole of the rest of the vegetation. This case is specially interesting as it is not a cultivated plant, and is one of that hardy band of fresh-water plants which are more widely distributed than any other class of plants known to me.

A very strong argument in favour of deterioration is the general statistical evidence. Out of some 700,000 flowering plants described, there is not one single case known to me of a plant which does not endeavour to reproduce by seed, although arrangements for vegetative reproduction are exceedingly common. Many plants which we do not, as a rule, look upon as vegetative reproducers habitually form underground stolons, rhizomes, &c., and are much more rarely formed from seed.

The answer to the second part of the question is probably a very simple one—old age. However much the method of vegetative reproduction varies, the new plant is merely a part of the old one. A potato grown from a tuber is not a new individual, but a part of the original individual. A close examination of bulbs, corms, rhizomes, suckers, stolons, &c., reveals essentially similar methods of branching, which are made different by the different parts in which the food-store is laid up. The differences, such as they are, have been made much more difficult to understand by the misdirected labours of conscientious botanists.

That old age is the primary cause I have personally no doubt at all. We know on good evidence (see Bonnier, *Traité de Botanique*) of trees 2,000 years old, not to speak of one kind only, but belonging to several genera. It is not necessary to cite the American mammoth tree of 8,800 years, or the Canary Island dragon tree of 10,000 years, which was probably the original of the Greek myth.

The number of years during which any species can be shown to have been always propagated vegetatively cannot surely be as many as 2,000 years, except possibly the sugar-cane and the vine, and in both these cases deterioration has set in. Old age is the reason generally given in both these cases.

Of course, all cultivated plants are grown under quite unnatural conditions. The brilliant sunshine and long, dry season of Chile are quite different from our insular climate. Cultivation under exceptionally favourable conditions must inevitably weaken the constitution of man,

beast, or vegetable, unless all our evolutionary theories are hopelessly wrong. Most cultivated plants must suffer from the absence of a struggle for existence and from one-sided selection. It might be possible to delay the deterioration by severe treatment, by change of soil and climate, and other methods. The survivors after such a treatment should be more vigorous than any selected at random for propagation.

A plant has an organised, correlated body, and reacts distinctly to change of climate. This reaction involves a one-sided development. I fail to see how a flowering plant can escape the common enemy—old age. Where are the potatoes of thirty years ago?

Mr. SUTTON said that in his experience deterioration of potatoes does take place sooner or later, the only well-marked exception to this rule being the 'Early Ashleaf,' which is now apparently as vigorous as it has ever been. Potatoes raised from seed show marked variation on every point, some deteriorating within five or six years, others not until the passage of a much longer period.

Mr. LINDSAY of Murrayfield, Midlothian, sent tubers of 'Maincrop' potatoes and of *Solanum tuberosum* raised from tubers planted out in ordinary unmanured garden soil in 1899, the plants having remained in the open ground unprotected and undisturbed, except for moving once in September 1902. The plants had not suffered from any kind of disease nor from frost, and do not appear to have deteriorated in any way. The question of the influence of the moister Scotch climate on the potato was raised, and the effect of flower and seed production on the vigour of the tubers produced was discussed.

Rust on Rose.—Dr. COOKE reported as follows on this well-known trouble:—"This rust was known half a century ago as *Uredo pinguis*, but afterwards as *Coleosporium pingue*, and was then considered to be an independent fungus. In more recent times it has been found that most of these parasites exist under three forms, or pass through three stages, viz.—(1) *Æcidium*, (2) *Uredo*, (3) *Teleutospore*. In the present instance (1) the *æcidium* form is *Coleosporium pingue*, (2) the *uredo* form is *Lecythea rosa*, and (3) the *teleutospore* form *Phragmidium subcorticatum*. The *Coleosporium* is the first form to appear in the spring, on the twigs and peduncles chiefly; near midsummer the *uredo* spores appear on the leaves; in autumn the *teleutospores* appear as black tufts on the under surface of the leaves. As an endophyte this pervades the tissue of the entire plant, and is very difficult to combat. It is recommended that all the affected spots be cut off as soon as they are recognised, and burnt, so as to prevent the dispersal of the spores. Before the buds expand in the spring, bushes that have been attacked the previous year should be well syringed with Bordeaux mixture. Leaves should be watched carefully through the summer, and when the *uredo* appears thereon, or later the *teleutospores*, the leaves should be picked off and burnt, because when the *teleutospores* germinate they are able to infect healthy roses, and produce the *Coleosporium* in the following spring. Occasional syringing with Bordeaux mixture checks both the first and second stages."

Diseased Arums.—Mr. SAUNDERS reported that he was able to find only a few springtails and two very minute worms in the tubers, and he

thought that neither was sufficient to cause the decay which had gone on to the depth of $\frac{1}{4}$ inch at the base of the tuber. The two smaller plants had healthy tubers so far as could be seen. Mr. Odell had also examined them and reported :—"The decay at the base of the tubers was not unlike in appearance the yellow root-rot of the hyacinth. I could not find anything to account for decay beyond a few springtails, and these I think would not cause so much injury. In the decayed portion there was evidence of bacteria due rather to the decayed matter than contributing to the cause of the decay, as I could not trace any bacteria high up in the tuber. I have isolated the plant, and shall attempt to grow it on for further examination, when I will submit it to the Committee. From the growers' remarks, drastic measures have been taken to remedy the trouble. I would suggest destroying the stock, taking care that the soil in which the plants have been grown be burnt or treated with lime, and that the pots be washed with a strong carbolic solution."

Vine Leaves Spotted.—Vine leaves were received from Roehampton having a large number of small blackish spots upon them. It was thought that the trouble was due to the lack of sufficient ventilation. Dr. Cooke took some to examine further.

Horse-chestnut Twigs Damaged.—Twigs from which the bark had been removed on one side near the beginning of last season's growth, curiously twisted and bent, were received from Wymondham. Mr. Saunders undertook to report upon them at the next meeting.

Fasciation.—Mr. Chittenden showed an example of this in the terminal flower of the hyacinth, and Mr. Worsdell showed fasciated aerial roots of ivy reaching half an inch in breadth in some cases. He considered the fasciation was brought about by a dichotomy of the growing-point, and it was suggested that this might be due to injury by insects, &c. Dr. Masters mentioned that a similar growth was sometimes seen in orchid roots and in roots of some of the *Cactaceae*.

Narcissus Fly.—Mr. Chittenden showed specimens of this fly (*Merodon equestris*) which he had bred, showing considerable variation in colour, from a foxy-red throughout to the commoner form with blackish bands.

Witch's Broom on Hornbeam.—Mr. Odell showed specimens of this similar in appearance to those commonly seen on birch, caused by a mite (*Eriophyes*).

Geographical Forms of Narcissus Bulbocodium.—Miss Willmott, V.M.H., exhibited a collection of *N. Bulbocodium* from all the known habitats of that species, showing a very large amount of variation both in foliage and flower.

Malformed Iris.—Mr. Worsley showed flowers of *Iris tuberosa* in which the stamens were branched, so that there were six or more anthers in each flower. Dr. Masters undertook to examine them.

SCIENTIFIC COMMITTEE, APRIL 25, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and ten members present.

Malformed Iris.—Dr. Masters showed a sketch of the stamens of the flowers of *Iris tuberosa*, brought to the last meeting by Mr. Worsley. The filament had branched so that each stamen bore two anthers.

Forms of Narcissus Bulbocodium.—Regarding these, shown at the last meeting, Miss Willmott, V.M.H., writes:—"I have some 200 geographical forms of *N. Bulbocodium* collected some fifty or sixty years ago by the late M. Alexis Jordan. They were cultivated by him at Lyons until his death, a few years since, then they passed into my hands. By his notes upon them, and my own observation during the years they have been in my possession, I find that the same amount of variation continues which M. Jordan observed fifty years ago. The time of flowering also varies by several weeks in some of the forms."

Injured Horse-chestnut Shoots.—Mr. Saunders, F.L.S., reported upon these, shown at the last meeting:—"I cannot find any cause for the injury. I can only suggest that the shoots may have been injured by blows from other branches in a gale, or from some other cause. The injuries were received some months ago."

Diseased Arums.—Mr. Güssow reported: "I have kept the roots under observation since March 28, but could not discover any cause of the injury whatever. The bacteria present in the decayed portion at the base of the tuber were saprophytic. . . . The plant should be kept dry for a period, and then transplanted into fresh sandy soil containing some charcoal. After forming new rootlets it should be transplanted and cultivated in the ordinary way."

Striped Auricula.—Mr. Douglas showed a curious form of flower, concerning which Mr. Horner writes:—"In all its florist types the auricula is infinitely variable from seed, but I believe that directly from the plant itself a sport is of very rare occurrence. A decided example of this, however, could be seen at the London show of the National Auricula Society, April 25. The plant was brought by my old friend, Mr. Ben Simonite, of Sheffield, and is a sport, with stripes of crimson and gold, from a bright red seedling of mine—'Firefly.'"

"This variety has proved very interesting. Some plants of it are constant to the original parental red colour; others have sported into pure lemon-yellow; others, again, into a deeper yellow, with a suffusion of red, like the sunny side of a ripe apricot. Very occasionally I have seen a striped flower or two in a head of plain yellow ones. I have never known the yellow sports revert to the original red, nor the striped ones pass back into plain red or yellow. It is, however, open to a striped break to produce an offset that shall not be striped, a contingency much to be deplored, because the rich crimson-and-gold variation is so far the rarest. In habit of foliage, 'Firefly' is densely mealed, and so are all the sports of it, except the striped one. In this the foliage has a most significant distinction, always to be relied upon. It consists in streaks or patches of pure green upon the otherwise white-mealed leaves."

Primrose Malformed.—Mr. A. W. Sutton, V.M.H., brought specimens which had been raised by division from the plant shown before the Committee two years ago, in which “the umbel was partly formed, but with multifold flowers of twelve parts, and with a partly petaloid calyx, &c.” The original plant was found in a wood close to Bucklebury Place, Berks, and seventy or eighty plants have been raised from it by division. Four of the plants have reverted to the common primrose, and show no variation whatever from the ordinary type. All the rest have partly formed umbels with multifold flowers, with the exception of three or four, which more or less closely resemble the form of the polyanthus. The plants, after division, have been left to the care of themselves, planted under an east wall on poor soil.

Double Primrose.—Mr. Sutton also showed double flowers of primrose gathered from a plant growing wild.

Ranunculus asiaticus var. *sanguineus*.—Mr. Sutton also submitted specimens of the single wild *Ranunculus asiaticus*, “which is, perhaps, the commonest wild flower of Palestine, where the plains are frequently carpeted with it. This is so much the case on the plain of Sharon that it has by many travellers been supposed to be the ‘rose of Sharon’ of Scripture. Wherever this ranunculus grows it is preceded in bloom by the single anemone, which flowers some two or three weeks earlier. As the single form of the ranunculus is seldom seen in England, travellers usually confuse the two plants and speak of both as anemones. The anemones are generally of the same colour as the ranunculus, but in certain localities produce flowers of the most lovely shades of mauve, purple, cerise, and white.” The ranunculus shows little variation, but forms with orange or bronzy-yellow flowers are occasionally met with. Mr. Bowles, F.L.S., said he had flowered the plant in his garden last year.

Spur of Dendrobium.—Dr. Masters showed drawings of a flower of *Dendrobium chrysotoxum*, received from Mr. Bowles, in which the spur had not developed fully. The structure seen in this flower clearly showed that the spur is not an outgrowth of the sepal, as is usually supposed, but is partially an axial structure.

Meconopsis integrifolia.—This newly introduced plant, shown by Messrs. Veitch, was, on the motion of Dr. Masters, seconded by Prof. Percival, awarded a Botanical Certificate.

Diseased Montbretia.—Mr. Bowles showed corms of *Montbretia* which were decaying at the base. Mr. Massee, V.M.H., undertook to examine them.

Apple-buds Injured.—These, sent by Mr. Dunlop, Armagh, appeared to be eaten away at the sides, and were taken by Mr. Saunders for examination.

Fruit-tree Twigs Injured.—Shoots of apple and pear having poorly developed and injured buds were taken by Mr. Saunders for examination.

Deterioration of Potatoes.—In continuation of the discussion on this subject, Mr. A. W. SUTTON said: “The special question under consideration is how far, if at all, varieties of potatoes deteriorate in quality or productiveness during the years which follow their first introduction. At the meeting of the Scientific Committee of the Royal Horticultural

Society on March 28, opinion was very much divided as to whether any such deterioration occurred or not, and this divergence of opinion was also apparent in the letters read to the Committee on the 11th inst. One writer, I think, even went so far as to say that because varieties of vines, such as 'Black Hamburg,' or varieties of bananas, &c., never vary or deteriorate from year to year, therefore no deterioration could take place in other plants, such as potatoes. Another expressed the opinion that because certain varieties of potatoes, such as the 'Ashleaf,' may be as good now as when first introduced, this in itself proved that the same was true of all other potatoes.

"It was even suggested that one reason why the deterioration of potatoes was so much spoken of was in order to create a demand for newly-introduced varieties at much higher prices than the older sorts, which, according to the writer (or speaker), would have been as good now as they were at first if they had received the same careful and liberal treatment always accorded to high-priced novelties. It is not conceivable that any merchant whose reputation depended upon the introduction of potatoes of sterling merit would discard a sort which continued to maintain its original quality and productiveness, in view of the fact that many seedlings do certainly deteriorate rapidly. There are, however, noteworthy exceptions. The 'Ashleaf' is certainly one which has 'come to stay,' and the 'Early Rose' is perhaps more widely grown in Europe now than at any period of its existence. 'Magnum Bonum' has also a record almost unequalled, and under certain aliases may have continued longer in general cultivation than has been supposed. The old 'Redskin Flourball' is another notable case of long-continued productiveness; the 'Maincrop' potato, a beautifully-formed white kidney, raised by Mr. James Clark, of Christchurch, Hants, about thirty years ago, is still one of the most profitable potatoes grown in the east of Scotland for the London market. The 'Maincrop' does not yield, and never has yielded, so heavily as some varieties, but the quality is uniformly good. The 'Langworthy' very closely resembles 'Maincrop' in these and other characteristics. 'Sutton's Early Regent' and 'Sutton's Ringleader,' both raised by Mr. Robert Fenn, have been widely grown for more than twenty years, and show little, if any, signs of deterioration. 'Sutton's Discovery,' so far, has not shown any sign of deterioration, no single case of a diseased tuber having yet been recorded, as far as I am aware, in England.

"I have nevertheless no hesitation whatever in affirming that all who have had much experience in raising and introducing seedling potatoes know perfectly well that it is not a question whether potatoes do or do not deteriorate: the great question in introducing a seedling potato is whether it possesses such a constitutional vigour as will enable it to maintain its productiveness and 'quality' for a reasonable number of years. A potato seed-berry may contain from two to three hundred fertile seeds, and no two of these are likely to produce plants exactly identical. As great variation will be seen in the shape of the tubers, the colour of the skin, the depth of the eyes, the colour of the flesh, the colour, form, character, and height of the foliage; the time of maturity, whether medium, early, or late; and the degree of productiveness. It is equally true that a similar variation exists as to the extent to which the

several seedlings will be able to maintain their original productiveness and quality. Seedling potatoes are not as a rule put 'into commerce' until the fifth or sixth year; and it often happens that those which show the greatest promise in their second or third year have been entirely surpassed in the fifth or sixth year by seedlings which gave little or no promise in the first, second, or third year. I remember the case of three or four out of a large batch of seedlings which gave extraordinary promise, and these were grown on to produce stock, but by the sixth year they had manifested such marked signs of deterioration that they were not put 'into commerce' at all; whereas others which showed little or no promise at the beginning became very popular varieties.

"Then, as regards disease, many seedlings are very often quite free for four or five years, and in the sixth or seventh year succumb to attack. If all this be true of seedling potatoes before they are distributed, it naturally follows that to a greater or less extent the same tendency to deteriorate will be seen during the years succeeding the introduction 'into commerce.' Those who have facilities for raising and testing simultaneously several hundreds of seedlings can, nevertheless, form a fairly accurate opinion by the fifth, sixth, or seventh year as to which out of so many seedlings is most likely to maintain its original vigour for a period sufficiently long. Where a comparatively small number of seedlings are raised year by year, it must in a great measure be guess-work as to what the future has in store for the seedlings. Undoubtedly pedigree in crossing is of great value, but even when the potatoes raised are the result of distinct cross-fertilisation, very few of the seedlings will exhibit the distinctive characteristics of either parent, although the qualities of both may be combined in many of the seedlings. I am, of course, only speaking of potato crosses and potato seedlings.

"On the other hand, a 'natural seedling,' i.e. a potato raised from the seed-berry of a plant without cross-fertilisation, will often bear a very close resemblance to its parent, in some cases so close as to be scarcely distinguishable; but the experience of twenty-five or thirty years would certainly lead me to say that such 'natural seedlings' are far more likely to deteriorate than those obtained by cross-fertilisation.

"It must not be forgotten that it is extremely difficult to secure exactly the parentage which potato-raisers often desire, in the first place because many potatoes produce few, if any, flowers, and some others which do flower produce little or no pollen, and also where pollen is produced it may not be available exactly at the right moment. But for these difficulties the judicious selection of parents might have a still greater effect upon the seedling potatoes introduced into commerce.

"A great deal has been said and written as to the necessity of rigorous selection in order to prevent or postpone deterioration. Mr. Burbidge quotes (but I believe inaccurately) Professor Hugo de Vries in support of selection as a means of both improving any variety of potato and of preventing its deterioration.

"Professor de Vries, whose experimental work will be closely followed by horticulturists, even though they may be unable to adopt the 'mutation theory' for the origin of species, very truly shows that any crop of corn or roots consists of individuals of varying vitality and

productiveness, and that this makes selection possible and desirable. I cannot think that Professor de Vries would for a moment include potatoes as roots in this connection, and without a precise reference to De Vries' work I cannot verify the quotation. Though the several plants in a corn or root crop are all separate individuals, as De Vries says, it is entirely otherwise with potatoes. In the case of potatoes, we all know that, if the crop is not mixed, only one 'individual' is represented in a crop, even if the field should be 50 or 100 acres in extent. Each plant is but a portion, in a semi-dormant state, of the plant which flourished in the previous season, and no selection in the world can make the plants of one year vary or differ from those of the previous year, of which they are integral parts. This can be proved by anyone who can devote the necessary time and ground to careful experiments, but I am aware that there is a common prejudice against this very obvious fact.

"Had Professor de Vries been speaking of the selection of potatoes he would of course have referred us, not to a crop of any one variety, each plant the same as the other, but to the 'nursery-bed' where the seedling plants were first raised from seed. It is here, and here alone, that we can say truly that a crop of potatoes 'consists of individuals of varying vitality and productiveness.' It is here alone that selection can be and is usefully employed by potato-raisers, and during the following years when the 'individuals' in groups, propagated directly from the original seedling plant, are grown side by side for the purpose of eliminating the least promising and retaining only those which are superior to others. Any selection after the first year is of course applied, not to single tubers nor to single plants, but to the several groups of plants representing each original seedling.

"It has been stated that the selection of small tubers for planting leads prematurely to deterioration, but provided each tuber be fully matured, the size of the 'set' planted does not greatly affect the crop, although the result of long-continued experiments points to medium-sized 'sets,' uncut, as giving the best return.

"The fact that some varieties produce seed very readily and others do not has been referred to as a possible explanation of deterioration; but the 'Ashleaf' is one which produces seed-berries quite as freely as any other variety, and it is the leading example of a potato which shows little or no deterioration.

"The method of storing 'seed potatoes' during the winter certainly has great influence on the succeeding crop. 'Sets' which are allowed to shrivel and exhaust themselves by throwing out long sprouts, which are rubbed off before planting, are naturally greatly inferior to those which have been well kept from the time of raising the crop in the previous autumn.

"Deterioration can certainly be postponed by a frequent change of seed from another district, and experience points to Scotland as the source from which such a change of seed is likely to give the best result. The reason why this is so has not been fully shown. It is thought by many that the moister and cooler soils of Scotland prolong the period of growth, and thus prevent premature ripening of the tubers. It is very interesting to note that even in Forres, N.B., Mr. Fraser obtains the best results by

getting his change of seed from a higher, colder, and later district, and that the worst results are from the drier and warmer soils.

"It may be interesting to note that in the first two or three years of a seedling's existence there often are very many more fibrous rootlets produced than in subsequent years, and this naturally may account for greater vigour and robustness. In the fourth, fifth, or sixth year these fibrous rootlets often decrease in number; but a potato which retains such a habit of growth may also conceivably be less liable to degeneration.

"It is sometimes considered that potatoes improve in quality after they have been put 'into commerce,' and there are instances which seem to prove this to be the case. It may consequently be true that vigour of growth and 'quality,' or flavour, are rarely found united in one variety—in other words, that improvement in 'quality' has been accompanied by loss of productiveness.

"Certainly it is the case that the one thing market dealers are now demanding more than anything else is 'quality' and flavour, and no one can well dispute the fact that few, if any, of the potatoes in commerce to-day either equal or surpass in flavour the old 'Dunbar Regent.' If this be so, nothing but deterioration or degeneration can possibly account for the total disappearance of this potato from 'commerce' at the present day.

"In my opinion the best safeguard against premature degeneration will be found in the exercise by raisers of greater caution in the introduction of new varieties; by growing a larger number of seedlings side by side under precisely similar conditions; and by subjecting them to a far more critical comparison with the best varieties already in commerce, so that only those which show very marked superiority and constitutional vigour may be chosen for introducing to the public."

Professor PERCIVAL thought that there were well-authenticated cases of sports (or bud variations) having arisen which were perpetuated after selection.

Coloured Leaf of Richardia.—Mr. Charrington, of Bury's Court, Reigate, sent a specimen of *Richardia Elliotiana* having a large yellow blotch on the leaf which left the flower-stalk just below the spathe—a kind of second spathe. This specimen has shown the same peculiarity for the past three years.

SCIENTIFIC COMMITTEE, MAY 9, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, with seventeen members present, and Dr. Johannsen of Copenhagen, Monsieur Correvon of Geneva, and Mr. Roupell, visitors.

Welcome to the Visitors.—Dr. Masters introduced the visitors, and welcomed them in the name of the Committee.

Fruit-buds Injured.—Mr. Saunders, F.L.S., reported on the specimens received at the last meeting from Mr. Robins:—"I cannot find enough insects or fungi on them to account for their condition. There are a few specimens of the mussel-scale (*Mytilaspis pomorum*) and of the apple-sucker (*Psylla mali*), both of which are decidedly injurious insects; but

there were so few of them that they could not have done any appreciable harm; there were also a few mites belonging to the genus *Trombidium*, but they are quite harmless. There were a number of empty egg-shells on all the shoots, and a few unhatched eggs, which I will try to rear. The buds do not look as if they had been injured by insects, but as though the frost had killed them, or that much maligned combination of circumstances commonly known as the weather. I should certainly recommend the use of the caustic-soda wash next winter." There was no sufficient evidence to show what had gnawed the apple-buds received from Mr. Dunlop.

Montbretia Corms Failing.—Mr. Massee, V.M.H., reported that these corms had for some reason or other failed to form new corms last season, and were therefore not growing this.

Deterioration of Potatoes.—Mr. Chittenden read the following summary of the discussion on this subject, which he had drawn up at the request of the Committee:—

I. Do potatoes deteriorate? It is important to note that deterioration may take place from a commercial point of view, or from actual degeneration of the plant itself. (See II. below.)

1. In the broad sense they undoubtedly do deteriorate.
2. But deterioration *per se* also seems to occur. *E.g.*, 'Buffs' and 'Dons,' previously good, succumbed to disease in 1845. 'Victoria' degenerated in time both as a cropper and in disease-resisting power. 'Dunbar Regent,' with its acknowledged excellent qualities, can have disappeared for no other reason than because it had deteriorated. Varieties degenerate sooner or later both in productiveness and resistance to disease, sometimes in as short a period as six years from the raising of the variety.

II. What are the evidences of deterioration?

1. As shown by the plant itself. (a) The leaves grow curly and stunted. (b) The plant does not develop properly, or (c) even fails to appear above ground at all. (d) The plant offers less resistance to disease (in eight years a reputed disease-proof variety became much diseased).
2. From the growers' point of view. (a) The produce is much lessened (in one case cited by 50 per cent. after two years) when grown on the same soil. (b) The size of the tuber is reduced ("in fifteen years the potatoes were no larger than marbles").

III. Why does deterioration occur?

1. It may be brought about by local conditions.
 - a. Treatment. (1) Wintering tubers under conditions causing premature sprouting. (2) Growing continuously on the same soil. (3) Unsuitable manuring. (4) Possibly by selection of small tubers (but this is by some regarded as unlikely).

- b. Economic reasons. (1) Supplanting by varieties of greater productiveness or other desirable quality. (2) Ease with which new varieties are raised. (3) Novelty of later-raised varieties.
2. But it is also due to inherent causes. (a) Old age or disturbance in the balance between waste and repair. (b) Possibly the tendency to form seed, but there is a marked exception in the 'Ashleaf.' (c) The potato is an exotic, and is, therefore, never grown under absolutely natural conditions. It may be that even after 800 years' cultivation it has not become completely adapted to or in harmony with its environment.

IV. How is the fact that certain varieties (e.g. 'Ashleaf,' 'Early Rose,' 'Magnum Bonum,' 'Maincrop') do not appear to have degenerated after long cultivation to be explained in view of the foregoing facts? It is probable that newly raised varieties vary in vigour as well as in other characters, some having sufficient vigour to carry them through only six years, others through very many. Cross-fertilisation, as a rule, results in the production of longer-lived varieties than does self-fertilisation.

V. Points of practical importance. How may the life of a variety be prolonged?

1. Greater care should be exercised by raisers in introducing new varieties. Only those with plenty of initial vigour should be offered to the public.
2. Well-matured tubers should be chosen for "seed." Size of seed is not so important, but unsuit tubers of medium size give, in the long run, the best results.
3. Selection of tubers in other directions can be expected to give but little result; "sports" do occasionally occur, but are usually of no practical value.
4. Sets should be stored so that they do not exhaust themselves by premature sprouting.
5. The seed should be frequently changed; the best seems to come from Scotland, but even there change of soil seems necessary. The second year's crop is usually the best.
6. Probably excessive manuring with nitrogenous manures may lead to more rapid degeneration.

VI. The main objections to the idea of degeneration naturally occurring in asexually produced varieties were (1) the fact that some varieties persist apparently unchanged for long periods—this point is dealt with in paragraph IV.; and (2) the idea that plants produced asexually are entirely new individuals, and not merely parts of one individual; this question cannot be regarded as definitely settled.

VII. Other points. The discussion also brought out a considerable body of facts regarding other plants, of great use and interest, and provided suggestions for a very large amount of experimental research.

Etherisation of Plants.—Professor Johansen, of Copenhagen, the inventor of the process, gave a short account of the method of etherising plants in order to shorten their period of rest and induce them to flower

more speedily (Journ. R.H.S. xxviii. (1908), p. 45), explaining his conception of the action of ether, &c., upon the plants.

Shoots of Yew Injured.—Mr. Saunders, F.L.S., showed some shoots of yew, the leaves of which appeared to be covered with a pale yellow alga. Mr. Massee undertook to examine these.

Hybrids.—Mr. Worsley showed flowers of a hybrid between *Tropaeolum peregrinum* and *T. Lobbianum*, and between a *Phyllocactus* hybrid and a white night-flowering species of *Cereus*. The flower was intermediate between the parents in all characters except that the stigma was white, while in the female parent it was purple, and in the male yellow. The flowers of the hybrid opened in the evening, and were at first scented.

Seedling Scillas.—Mr. Worsley also showed seedlings of *Scilla campanulata* bearing pink flowers. The seed had been saved from plants with blue flowers, the only others near being white, no pink-flowered plants being in the garden.

Effect of Manures on Rye.—Mr. Baker showed specimens of rye grown under different manurial conditions. What was apparently the best part of the field was untreated and bore very poorly; the other parts, on a poor, chalky soil, received dung or ashes from a destructor. The former gave a very lush growth, which was, however, weak and somewhat crippled at the nodes, while the crop on the portion manured with destructor ashes, which contained no nitrogenous matter and much potash and phosphoric acid, was strong and healthy-looking.

Shoots of Rose Injured by Weevils.—Mr. Saunders reported on some shoots of rose, sent by Mr. Yarde, of Northampton (the young shoots had been eaten, and rings were gnawed round the stronger shoots), as follows: "The injury was caused by the 'clay-coloured weevil' (*Otiorhynchus picipes*), which feeds only at night, when they may be shaken off the bushes into an open umbrella, or on to boards or sheets of metal freshly tarred, or on to white cloths laid under the bushes. They will lie as if dead, and remain still with their limbs close to their bodies for a minute or two, so that there is plenty of time to collect them. The insects hide very carefully during the day, and small bundles of dry moss or hay tied to the stems of the roses would provide them with suitable shelter. These should be examined every morning to see if any weevils are present. The weevils often prove troublesome in greenhouses, and their grubs feed on the roots of ferns, cyclamens, primulas, and other plants.

Pagoscope.—Dr. Masters showed a "pagoscope"—an instrument invented recently in France—by which it is possible to ascertain, with approximate accuracy, the previous night, (1) the probability of a frost before morning, (2) the possibility of a frost, or (3) the certainty of freedom from frost. He had tested the instrument for some time, and had found it to be satisfactory.

SCIENTIFIC COMMITTEE, MAY 23, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eleven members present.

Shoots of Yew Injured.—Dr. Cooke, V.M.H., reported that the injury to these shoots, shown at the last meeting, was due to the interference

with the proper performance of their functions by the presence of a complete covering of the alga *Pleurococcus vulgaris* on their upper surface.

Diseased Cucumber Leaves.—Mr. Massee, V.M.H., reported that the leaves sent by Mr. Terry were attacked by the fungus *Cercospora melonis*, Cooke.

Raspberry Moth.—Mr. Saunders, F.L.S., reported on some shoots of Raspberry in which the buds had failed to grow:—"The buds on the raspberry were attacked by the caterpillars of a small moth, the 'raspberry-moth,' *Lampronia rubiella*. Any of the canes which are badly infested should be cut out at once and burnt; if only a few buds are affected they should be picked off and treated in the same way; in doing this, however, be sure that the grubs are not left in the cane. The moths lay their eggs in the flowers of the plants, and the young caterpillars make their way into the core of the fruit, where they do not appear to do any harm. Later on they let themselves down by silk threads, or crawl down, to the stool of the plant, where they hide among dead leaves or rubbish, in cracks of the soil, or in some inequality in the bark of the canes, &c. Each then spins a thin silken cocoon round itself, and in this position passes the winter; in March, earlier or later according to the season, they leave their winter quarters and crawl up the canes and make their way into the base of the buds. When fully grown they form a chamber in the pith of the cane, in which they become chrysalides, from which the moths emerge in about three weeks. During the winter the stools should be thoroughly cleaned, and all rubbish, dead leaves, &c., carried away and burnt. They should then be earthed up, which should prevent any caterpillars still in the stools from ascending the canes, the bases of which should be painted with a thick solution of paraffin emulsion as a further safeguard."

Scale on Cotoneaster.—Mr. Saunders also reported on insects on *Cotoneaster* sent by Mr. Bunyard:—"These are badly attacked by the 'mussel-scale' (*Mytilaspis pomorum*), and to a less degree by the 'brown peach-scale' *Lecanium persica* var. *Sarothamni*. I should cut out as many of the infested branches as can be spared, and then, towards the end of May and again early in June, spray with paraffin emulsion, taking care that the insecticide reaches the back of the shoots that are against the wall; another spraying might be given with advantage about the middle of June. The particular reason for spraying at this time of year is to destroy the young insects as soon as they begin to leave the shelter of the scale of their mother and to find fresh quarters for themselves. If it were not an evergreen plant, I should recommend spraying with a caustic alkali-wash in the course of the winter, but a good spraying with paraffin emulsion then could not be otherwise than beneficial, and it would prove more efficacious if the plant were protected by a mat afterwards, to prevent the insecticide being washed off by the rain."

New Primulas.—The following newly introduced primulas from Western China were exhibited by Messrs. J. Veitch & Sons:—*Primula vittata*, Bureau et Franchet; *P. deflexa*, Duthie; *P. nivalis farinosa*, Schrenk; and *P. Cockburniana*, Hemsley. On the motion of Dr. Masters, seconded by Mr. Douglas, a Botanical Certificate was unanimously awarded

to *P. Cockburniana*, a Chinese species bearing flowers of an orange colour, reminding one of the colour of *Hieracium aurantiacum*, quite a novel colour in primulas, and quite distinct in colour from any previously known primrose.

Double-coloured Spathe in Richardia Elliotiana.—Mr. Batchelder, of Ipswich, sent photographs of a plant bearing a second spathe completely coloured yellow, unlike those usually exhibited, where a second spathe has usually a large yellow blotch.

Seeds from Caucasus.—Mr. S. Hogg sent seeds of *Dolichos Lablab*, syn. *Lablab vulgaris*, and *Staphylea colchica*, requesting the names.

Diseased Potatoes.—Mr. Z. Gray, F.R.H.S., sent potato tubers badly affected by the black scab disease, which has spread so much in this country lately.

Laurel Leaves Injured.—Mr. Saunders showed some leaves of laurel, each of which contained large numbers of holes. Dr. Cooke undertook to examine them.

Phyllocactus.—Mr. Worsley showed several fine forms of *Phyllocactus*, and remarked upon the difficulty there is in fixing the origin of the garden cacti. It appears that two very unlike species are sent out under the name *Phyllocactus crenatus*, one having scales up to the base of the flower, the other having a long naked ovary. Garden forms appear to show very little trace of the latter character. It was decided that at a future meeting the question of the origin of these forms should be brought forward.

Cereus amecaensis.—Mr. Worsley also showed a flower of this very fine white-flowered species from Mexico.

Botanical Certificates.—Resolved: "That the Council be requested to ordain that in future the recommendation of awards of Botanical Certificates be confined to the Scientific Committee."

SCIENTIFIC COMMITTEE, JUNE 20, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and twelve members present.

Pear Midge.—Mr. Bowles, F.L.S., showed specimens of pears attacked by the grubs of this fly, which also contained the larvæ of a small moth. These were referred to Mr. Saunders.

Fieldchafers.—Mr. Gordon, V.M.H., showed specimens of these beetles (*Phyllopertha horticola*, L.), which are something like small cockchafers, and are reported to be very destructive to leaves and flowers. The larvæ feed on the roots of grasses, living for three years. They are very similar to the larvæ of the cockchafer, but much smaller.

Black-currant Mite.—Mr. Shea called attention to the fact that he had grown the variety of black currant 'Boskoop Giant' for the past four years, and had not found any signs of mite upon it, although other varieties growing in close proximity were suffering severely from the attacks of the mite. Several other members of the Committee had had a similar experience. Mr. Shea attributed the immunity of this variety to the fact that the buds were protected by relatively hard and impenetrable scale leaves, through which, in all probability, the mite could not pierce.

Disease of Cactaceæ.—Mr. Worsley showed specimens of a scabby growth on the stems of *Phyllocactus*, which Mr. Massee undertook to examine.

Melons Dying.—Specimens of melon suffering from the attacks of eelworm at the roots came from Hatfield, Herts. The method of dealing with this troublesome pest was detailed in the JOURN. R.H.S. xxviii. (1904), p. xxiv.

Vines Diseased.—Vine leaves showing large yellow patches and somewhat papery in texture, from vines bearing much smaller fruit than usual, were sent from Stafford. No fungi or insects were to be seen, but it was considered that the vines (four out of nine in one house of 'Black Hamburg') were suffering from some condition in the border that affected the roots, possibly choked drainage.

Primula pycnoloba (Bur. et Franch.).—This newly introduced species from W. China was shown by Messrs. Veitch. The plant bears an umbel of flowers with large, inflated calyces, and a small, deep orange-coloured corolla, scarcely exerted beyond the calyx-tube. The Committee desired to see this at a future meeting.

Origin of Garden Forms of Phyllocactus.—Letters on this subject were received from Messrs. Veitch, of Chelsea, and from M. de Laet, of Contich. The former stated that in the raising of their hybrids *Phyllocactus Ackermannii*, *P. crenatus*, *P. phyllanthoides*, and *P. albus superbus* had been used, as well as the best English and Continental forms known when the raising of the 'Veitch's hybrids' was commenced. M. de Laet, of Contich, wrote that the following come true from seed: *P. anguliger*, *P. Ackermannii*, *P. grandis*, *P. latifrons*, *P. phyllanthoides*, *P. strictus*, *P. crenatus*, and *P. Hookeri*, and may be regarded as true species. Hybrids are: i., *P. crenatus* × *Cereus grandiflorus* produced the *Cooperi* class; ii., *P. crenatus* × *P. phyllanthoides* (small flowers) produced the *rosa* hybrids, such as *Vogeli*; iii., *P. Ackermannii* × *Cereus speciosus* have given the most beautifully-coloured hybrids, such as × *Feastii*, × 'Conway Giant,' &c.; and iv., all have been recrossed and have given most interesting forms and colours. "I myself obtained unexpected results. For instance, I obtained the *Cooperi* form, true in form, but of the finest pure red colour, and just last week (seedlings from 1900 and 1899) two forms of the red *Cooperi*, but shaded with purple (cross *Cooperi* × 'Conway Giant'). Another interesting cross is 'Joseph de Laet,' of two shades of blue. Usually all the *Phyllocacti* have the colours of the sepals and petals shading into one another softly; but in this the contrast is forced, the sepals being very dark and the petals of the softest shades. The value of this plant lies in the colour, not in the form; there are better forms ('Niobe' × 'Docteur Hernu')."

Mr. WORSLEY made some remarks upon the foregoing, but reserved a fuller account of these plants for a future occasion.

SCIENTIFIC COMMITTEE, JULY 4, 1905.

Dr. M. C. COOKE, V.M.H., in the Chair, and six members present.

Biota Attacked by Insects.—Mr. Worsley sent specimens, which Mr. Saunders, F.L.S., reported were attacked by an aphid, *Lachnus cupressus*,

and *Diaspis Carueli* (scale insect). A large number of varieties of Chinese Conifers had been attacked and destroyed.

Pear Midge.—Mr. Saunders, F.L.S., reported as follows upon this pest:—"The pear midge (*Diplosis pyrivora*) seems to be spreading more and more every year in this country, and unless some means can be found to check it pears will become a rare fruit. I think it is very clear that if all fruit-growers in districts where this insect abounds would agree together on some common line of action as regards the destruction of this pest, its numbers would soon be very materially lessened, and in the course of a few years it would be stamped out. These remarks apply to a very considerable number of injurious insects, which at present run riot among our crops, and to check which isolated attempts are of little use, as a fresh supply is always forthcoming from neighbours' gardens, &c. The pear midge lays its eggs in the blossoms before and after they open; if before, the ovipositor of the insect pierces the petals, and the eggs are laid on the anthers; if the flowers are already open, they are deposited in the ovary; in either case the young larvæ find their food close at hand when they are hatched. In June they leave the fruit, sometimes before it has fallen, sometimes afterwards. They then bury themselves in the soil $1\frac{1}{2}$ inch, or perhaps somewhat deeper, and become pupæ, from which the flies emerge in the spring just before the flower-buds open. The best means of destroying this pest are—(1) by strewing kainit under the trees at the rate of 4 oz. to the square yard early in June, so that the grubs may fall on it; or (2) in the course of the winter remove the top soil to the depth of 2 inches, and either burn it or bury it not less than a foot below the surface, or trench the ground under the trees in the winter, which will bury the pupæ so deep that the flies cannot find their way to the surface; (3) in the spring, before the time that the flies make their appearance, the ground under the trees should be rolled, so that it will make the escape of the flies more difficult through the hard soil. In orchards where grass grows under the trees it is impossible to employ these methods. In that case the grass should be thoroughly drenched with a strong solution of paraffin emulsion early in April, in order to destroy the flies as they are leaving the soil, and again in June, when the grubs are leaving the fruit. If it be found that nearly the whole crop is infected, it should be gathered and burnt while the grubs are still in the fruit.

Interesting Orchids.—Mr. F. W. Moore, V.M.H., sent the following interesting orchids from the Botanic Gardens, Glasnevin:—

No. 1. *Staurosis fasciata*, a native of Malaya, and a rare species, belonging to the distichous-leaved section. It is rarely found in collections, and is remarkable for the curious shape of the lip and its attachment.

No. 2. *Bulbophyllum saurocephalum*, also a rare plant, native of the Philippines. It is remarkable for its swollen peduncle, and belongs to the clavate group. The species in this group are closely allied, and are all characterised by the swollen flower-stalk, in which the flowers are generally sunk.

No. 3. *Bulbophyllum quadrifarium* (Rolfe). This is a new species from Madagascar, recently named and described. It is very rare, and is remarkable in having a portion of the peduncle carrying the flowers quite

square. There are numerous scales concealing the flowers. The inconspicuous flowers seem to be highly self-fertile, as a number of fruits were produced on each inflorescence.

No. 4. *Bulbophyllum erythrorachis* (Rolfe). A new species like the last two, with a long, club-shaped, red rachis.

No. 5. *Bulbophyllum inflatum* (Rolfe). A new species with a curiously inflated rachis, about $2\frac{1}{2}$ inches long and $\frac{3}{4}$ inch in diameter, bearing numerous small greenish-white flowers.

Fasciated and Contorted Teasels.—Professor Boulger, on behalf of Dr. Masters, showed a walking-stick made from a curiously contorted teasel stem. Prof. de Vries has stated that this peculiarity can be perpetuated by seed, but after growing the seed obtained from Prof. de Vries, and following the directions given for at least ten years, Dr. Masters has failed to obtain any contorted specimens, although by continued pinching a large amount of variation may be observed in the foliage, sometimes four leaves occurring in a whorl, and so on.

Disease of Salsafy.—Mr. Saunders showed a specimen of salsafy attacked by the fungus *Cystopus Tragopogonis*, very commonly found upon goat's-beard.

Damage by Hail.—Dr. Plowright sent specimens of peas, cabbage, and apples illustrating the damage done by a recent hailstorm to these crops.

Excrescences on Tree-trunks.—Mr. Benedict sent an example of an excrescence on the trunk of a poplar, about 8 inches in diameter, covered with small shoots and adventitious buds, stating that similar excrescences were developed on laburnum, elm, and plane. It was thought that the tree had made an effort to heal a wound made in pruning or otherwise, that from the callus formed numerous adventitious buds had arisen, and that neither a fungus nor an insect was the cause of the trouble. The sender thought that probably too deep planting had been a contributory cause.

British Dye Plants.—Dr. Plowright sent the following notes, with specimens of the dyes described :—

"1. *Hedera Helix*.—The ivy is a plant we always regard as being one of the most sombre of our English phanerogams. I was very much astonished a short time ago to find that the ripe berries yielded, on boiling with water and a small quantity of alum, a rich reddish-purple fluid which had the property of conveying to wool a reddish tint. There are very few red colours yielded by our British dye plants. The red dye of ivy-berries is not mentioned by Linnæus or by Withering, nor any of the botanical writers of that period whose works I have read. The roots of the plant from which the berries were taken, it may be observed, show numerous stains of red. The coloration of the roots is not soluble in boiling water or in alcohol. The colour is mostly in the cortex, but extends to the outer part of the wood, old roots and rootlets both showing it.

"2. *Cratægus Oxyacantha*.—The mayflower has many poetical associations—few plants have not: it will come as a surprise to many people (but not to all) that the blossom is capable of yielding a dye. One would hardly have expected the beautiful white petals to have yielded such a

deep shade of yellow as they are capable of imparting to wool when mordanted with alum.

"2. *Populus nigra*.—The colouring matter contained in the male catkins of the black poplar was not known to the older botanists, or, at any rate, was not referred to by Linnæus. This is possibly accounted for by the fact that it does not easily impart itself to wool, and could not be used for that purpose by any of the rough-and-ready processes then employed. My attention was first drawn to it by noticing how the foot-pavements in towns were stained by the crushing underfoot of the catkins which had fallen from the tree when in bloom in spring. The stains are a bluish or bluish-green colour, and remain visible for a considerable time. The catkins, or rather the anthers, are of a brilliant red, so that the contrast is very marked. The colour yields itself freely to boiling water to which alum is added, but the salt is not sufficiently acid to produce the full deep red. Unlike most colouring matters obtained from flowers, this red is very permanent when exposed to light. The specimen shown was made in 1902, as the label shows. It was placed in light in a north window until the present time. So far as my remembrance goes, it has lost little, if any, of the colour, but the ink with which the label was written has faded to such a degree as to be barely legible. The red colour is also soluble in alcohol. Linnæus noticed other colours which, although yielding themselves to alcohol and water, were not available for tinctorial purposes, such as the red which the flowers of *Hypericum perforatum* yield to alcohol, and the green which the flowers of *Delphinium Consolida* give to solutions of alum in water. It is curious that the poplar catkins escaped him.

"4. *Lithospermum officinale*.—The old writers, from Linnæus, were acquainted with the fact that the root of this plant imparts to fats, oils, alcohol, and wax a red colour. They also state that the roots were used by the young women of Sweden to impart a pink colour to their complexion. Mr. E. J. Tatum was kind enough to send me some specimens of this plant in April. The colour is confined to the cortical portions of the main roots. It is distributed in patches, which, when rubbed between the fingers, stain them red in the same manner as but to a less degree than the true alkanet-root does. The red colour imparts to solid paraffin a red tint very similar to that from the root of *Echium vulgare*. The red coloration is more abundant in the roots of *Lithospermum* than in those of *Echium*."

Exotic Spider.—Dr. Plowright also sent a specimen of a large spider which had been imported alive in a cold-storage chamber.

Strawberries Attacked by Millipedes.—Mr. Saunders, F.L.S., reported upon these as follows:—"The 'beast' attacking the strawberries is one of the 'snake millipedes,' the spotted snake millipede (*Julus guttatus*). This is a most destructive pest in gardens, since it attacks the roots of various plants. While in the soil it is almost impossible to kill them with any insecticide; but if a strong solution of common salt or nitrate of soda can be brought to bear on them it will kill them. They may be trapped by burying small slices of mangold, turnip, carrot, or potato near the plants they are feeding on, just below the surface of the soil. These traps should be examined every morning; a small skewer stuck

into the pieces will show where they are buried. The millipedes appear, however, to be so fond of ripe strawberries that I doubt if these baits would tempt them away from them. Placing straw, &c., under the fruit, as is so often done, I am sure encourages these pests."

Scale on Ash.—Mr. Saunders reported :—"The insects infesting the pieces of ash-stem are scale insects. The larger white woolly ones are female specimens of *Pseudococcus aceris* (Signoret); the insect itself is at one end of the ovisac, almost hidden by the wool-like matter with which the eggs are surrounded. The other insects, which look like small long white specks (only $\frac{1}{2}$ mm. or 1-40th of an inch in length), are the males of *Chionaspis salicis*, an insect which is very common on the ash, various kinds of willow, and the alder. The female scales are nearly twice the length of the males, and are of a more or less oval or rounded form. The best means of destroying the *Pseudococcus* is by brushing off the white ovisacs, and then spraying with a strong solution of paraffin emulsion; or in the course of the winter, after the leaves have fallen and before the buds show any signs of opening in the spring, with a caustic wash. The same methods will destroy the *Chionaspis*."

Violets Attacked by Æcidium.—Dr. Cooke, V.M.H., reported on these, received from Bournemouth :—"The violets are attacked by violet cluster-cups (Journ. R.H.S. xxvii. (1902), p. 25, pl. i., fig. 21). Plants once attacked seldom recover. It is an endophytic parasite, and cannot be eradicated from a plant in which it has become established. As a precaution, all the infested plants should be rooted up and burnt. The others should be sprayed with Bordeaux mixture to preserve them from infection by any spores left on the soil."

Botanical Certificate.—A letter was received from the Council saying that the resolution passed by the Committee at a recent meeting would be borne in mind in making the arrangements for next year.

SCIENTIFIC COMMITTEE, JULY 18, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eight members present.

Diseased Potato-leaf.—Dr. Cooke, V.M.H., reported on the potato-leaf brought by Mr. Saunders to the last meeting :—"The black blotch on potato-leaves bears a superficial resemblance to that caused by *Macrosporium solani*; but in the specimens submitted to examination no mycelium or conidia could be detected, the spots being entirely barren." The leaves were curled and blotched with yellow and black.

Contorted Teasels.—Dr. Masters, F.R.S., remarked further upon these, that some plants, specimens of which he showed, had after persistent pinching at last begun to twist, a peculiarity which Prof. de Vries said was an inherited character, but which Dr. Masters, after cultivating the plants (grown from seed received from Prof. de Vries) for ten or more years, had not been able to observe before.

Diseased Mulberry Leaves.—Mr. Saunders, F.L.S., showed specimens of mulberry leaves from Algiers apparently attacked by some fungus, which Dr. Cooke and Mr. Güssow undertook to examine.

Dry-rot in Floor-boards.—Mrs. Davies sent specimens from Deal of this too well-known trouble caused by the fungus *Merulius lacrymans*.

White Poplar with Two Forms of Leaves.—Mr. Holmes, F.L.S., sent shoots of white poplar showing glabrous dark green leaves on the lower part of the shoot, and white woolly-looking ones above.

Insects on Biota, &c.—Mr. Woralee remarked upon this, reported on at the last meeting by Mr. Saunders, that many garden forms had been attacked and killed by the insects, while the species like *Juniperus chinensis* seemed to be little injured. He suggested that this might be due to the decrease in vigour shown by the vegetatively propagated varieties, as compared with the species usually raised from seed.

SCIENTIFIC COMMITTEE, AUGUST 1, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and twelve members present.

Mites on Furze.—Mr. Saunders, F.L.S., said:—"The mites on furze sent by Mr. Holmes, which were found so abundantly at Malvern, are one of the many species of *Tetranychus*, or red spider, and are probably *T. lintearius*, as this species has been found to spin webs over gorse bushes in the way described by Mr. Holmes."

Disease on Mulberry Leaves.—Dr. Cooke, V.M.H., reported:—"The spots on mulberry-leaves are strongly suggestive of *Cercospora moricola*, Cooke (see JOURN. R.H.S. xxviii. p. 80, pl. xii. fig. 20), but no hyphæ or conidia could be found."

Eggs of Moths on Flowers.—Miss Aldam, of Warmsworth, Doncaster, sent flowers of pelargonium on which masses of eggs had been deposited. Mr. Saunders reported:—"The eggs are those of a moth belonging to the family *Noctuidæ*, and are very probably those of the common Y-moth (*Plusia gamma*), but the eggs of several members of this family are so much alike that I cannot say for certain. It is unusual for moths to lay their eggs on flowers, as the latter usually wither before the eggs are hatched; but many moths lay large numbers of eggs together on the leaves or stems of plants."

Insects on Apple-trees.—Mr. Saunders also reported on insects from apple-trees sent by the Countess of Leitrim:—"The only creatures which were in any way injurious were the caterpillars of the vapourer moth and the frog hopper; the spiders and the long-legged 'harvest-men' are not only harmless but beneficial in gardens, as they prey on other insects. The caterpillars of the vapourer moth (*Orgyia antiqua*) feed on a large variety of shrubs and trees. The caterpillars, being hairy, are not so easily killed by spraying as many are, but their food may be made distasteful or poisonous to them by spraying with paraffin emulsion or 'Paris green.' The latter substance is poisonous, and it should not be employed within a month of the fruit being used for food. The caterpillars should, if possible, be picked off by hand. The frog hoppers belong to the family *Cercopidæ*. I should not imagine that they are in such abundance as to be of any real injury to the trees. The 'harvest-men' are curious-looking creatures, having such small bodies and long legs.

They belong to a family (the *Phalangida*) which are classed between the spiders proper and the scorpions. They are perfectly harmless to plants and human beings, and feed on aphides and other small insects. The small spiders which spin webs are also very useful in killing various small winged insects."

Fungus on Roots of Trees.—Mrs. Ashton, of Robertsbridge, Sussex, on digging up two peach trees which suffered from silver-leaf, found their roots were covered with fungus. A fungus also appeared on the floor of a tool-house which backed against the orchard-house where the peach trees grew. Dr. Cooke wrote:—"Probably the fungus under the tool-house and that on the tree-roots is the same. It is evident there is a large amount of fungus in the soil, proceeding probably from dead roots or decaying wood. No trees can thrive with this in the soil. If possible a deep trench should be dug between the tool-house floor and the orchard-house to cut the connection, and lime should be used freely. The soil should be well dug up about the fruit trees, and the source of the root fungus found. Anyhow, the soil must be cleared of the white fungus mycelium, or all the trees will ultimately be killed. The soil must be well drained, as the fungus thrives best in stagnant water. In France it has been found effective to expose and powder liberally with flowers of sulphur the roots of trees which are attacked. Thorough and severe steps taken at once may save much future trouble and expense."

Pears Cracked and Scabbed.—Dr. Bonavia sent pears from a young tree of 'Conference,' which were badly cracked owing to the attacks of the fungus *Fusicladium pirinum* (see JOURN. R.H.S. xxviii. (1903), p. 14).

Lilium giganteum Rotting.—A shoot of *Lilium giganteum*, which had rotted off completely near the point when about 18 inches high, was received from Mansfield. It was thought that in all probability this was due to the presence of excessive moisture.

Interesting Orchids.—Mr. F. W. Moore, V.M.H., sent from Glasnevin two species of *Megaclinium* having a curious flattened rachis on which the flowers were borne in two rows, one along the middle of each of the flat faces. Sir Trevor Lawrence, V.M.H., exhibited specimens of *Nephelaphyllum pulchrum*, a native of Java, which has been long in cultivation but is rarely seen, and of *Theodorea gomezoides*, a native of Brazil.

Longevity of Seeds.—As an illustration of this point, the Rev. W. Wilks stated that for the past twenty-six years a garden rubbish-heap had stood in a small wood near his house, and during that time only stinging nettles had grown upon it. The stinging nettles had this year been uprooted and the heap levelled, and now wherever the soil had been placed large numbers of opium poppies, *Papaver somniferum*, had sprung up, together with one plant of borage. The only explanation possible was that the poppy seeds had remained dormant for the past twenty-six years. Mr. Druery, V.M.H., remarked that a similar thing had occurred when some soil had been taken from under a house which had been built quite a hundred years. Wherever the soil was spread, there the poppies sprang up. Other members related similar occurrences, in each case *Papaver somniferum* being the plant that appeared. Mr. Holmes, F.L.S., mentioned an instance where *Hyoscyamus niger* grew under similar circumstances.

Harvest Bugs.—The Rev. W. Wilks asked how harvest bugs might be combated. It was recommended to bathe the affected parts with salt water. Ammonia kills the bugs, while lard or grease alleviates the pain for a time.

Sports of Pteris aquilina.—Mr. Druery, V.M.H., showed photographs of fronds of *Pteris aquilina* gathered at Pitlochry. The fronds were very congested, crested at the ends, and somewhat crispate. The plant from which they were taken was growing in very stony ground.

British Plants.—Mr. Holmes, F.L.S., showed a proliferous specimen of the common toad rush, *Juncus bufonius*, and some plants of *Matricaria discoidea*, an introduced plant.

Yellow-flowered Potato.—Mr. Sutton showed a portion of a potato plant bearing yellow or orange-coloured flowers, with the following notes: "As you are aware, the flowers of potato-plants are either white or some shade of lilac or purple, and until last year I do not think that an orange-coloured potato-flower had been seen or recorded. The history of the plant from which the accompanying specimen was taken is as follows: When inspecting a twenty-acre field of the 'Up-to-Date' potato last year in Lincolnshire we noticed an orange-coloured flower, which in the distance appeared to be a yellow nettle, but on closer examination it proved to be a potato-flower. So far as we could possibly tell, the plant was quite typical of the 'Up-to-Date' variety, except in the colour of the flower. The whole field was carefully examined, and no other yellow or orange-coloured flower could be found. When the crop was lifted the tubers seemed to resemble the 'Up-to-Date' potato in all respects. Last spring we planted nine of the tubers taken from these plants, and in every case the plants have produced orange-coloured flowers, and the foliage in all respects resembles that of the 'Up-to-Date' potato. The normal colour of the 'Up-to-Date' flower is of a rather dark lilac shade." The petals were thickened along the edge, and were in some cases becoming staminoid, bearing pollen on the margins.

Ornithogalum Eckloni, &c.—Mr. Worsley remarked that the foliage of the plant shown by him at the last meeting differed from that of the plant as cultivated at Kew in having a pale green stripe running down the middle of the upper surface of the leaf. Mr. Worsley also showed some sprays of *Tropæolum pentaphyllum* in full flower, gathered from a plant nine feet high, grown at Isleworth. He remarked that as the flowers fade they turn green. He also showed specimens of a semi-double Canna, and drew attention to the fact that bees were seen paying considerable attention to the leaves of Wistaria, which had on the under surface a considerable amount of sticky fluid. There were numbers of aphides on these leaves.

SCIENTIFIC COMMITTEE, AUGUST 15, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and six members present.

Harvest Bugs.—Concerning these troublesome pests, Mr. J. S. Turner writes: "There is nothing like common soap with which to combat harvest bugs. Just dip the soap in water, so as to make it only damp

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enough to rub, and rub it over the spots. The soda in the soap allays the irritation at once, and the thin film of soap stops the hole the insect has made, and finishes him. If the wrists, knees, and ankles, the parts most usually attacked, be rubbed with coal-tar soap, it will to a certain extent prevent the pest from attacking, but not entirely, and I know nothing that will." Mr. Wright recommends the use of Elliman's Em-brocation.

Grubs in Ferns.—Fronds of a variety of the Lady fern were sent from Wisley, infested with grubs. Mr. Saunders, F.L.S., reported: "The grubs infesting the stems of the fern-fronds are those of one of the saw-flies, but I have not been able to get their names. As far as a remedy is concerned, I can only suggest the obvious one of cutting off and burning the fronds."

Blotches on Rose-leaves.—Mr. T. S. Drake, of Hoddesdon, sent rose-leaves bearing black blotches caused by the attacks of the fungus *Actinomena rosea*, which is described in the JOURN. R.H.S. xxvii. p. 42, pl. iii., fig. 50.

Melon-leaves Shrivelling.—A small melon plant with shrivelling leaves was received from Lamberhurst. It was the general opinion that the recent transplanting had put the plant under considerably changed conditions, and through this the leaves had become injured.

Fasciated Agapanthus.—Dr. Masters, F.R.S., showed a much twisted and fasciated stem of white *Agapanthus* from Mr. Fitzherbert.

Lilium candidum, plumose variety.—Dr. Masters showed a specimen of a plumose form of *Lilium candidum*. This curious form was figured by several of the old botanists, but was recently sent to him as a hybrid between the 'Madonna Lily' and *Galtonia candicans*. Dr. Masters also showed a stem of *Lilium chalcedonicum* bearing a bulbil in place of a terminal bud instead of occupying the place of a lateral bud as is usual.

Figs Diseased.—Dr. Cooke reported that some figs which he had examined were badly affected with the fungus *Botrytis cinerea*, which had formed quite a felt upon them.

Monstrous Cucumbers.—Mr. J. Crook, F.R.H.S., of Forde Abbey, Chard, sent several examples of cucumbers showing lateral proliferation. The outer rind of the cucumbers had given rise to a large number of leaves, and in one case to a short stem bearing two other cucumbers upon it, each of which bore leaves growing from their outer portions. Dr. Masters remarked that from a botanical point of view it is easy to understand these monstrosities, since the rind of the cucumber is really a branch in which the true fruit of the cucumber is embedded, but what actually induces the production of leaves or branches from the rind in any particular case is so far an unsolved problem.

Dichroism in Antirrhinum.—Mr. Saunders, F.L.S., showed a figure of a spike of *Antirrhinum*, in which one flower was of a deep pink colour, while the others were white, splashed with pink. All other flowers on the plant had been of the latter type.

Clematis with leaf-like Sepal.—Mr. Saunders also showed a drawing of a clematis flower in which one of the sepals was green and leaf-like, with the exception of a portion near one edge, which was of the normal colour.

Osmunda Fronds as Food.—Mr. Druery, V.M.H., showed a specimen of the dried young fronds of *Osmunda regalis* which had been sent to him by the Yokohama Nursery Co. with the following note:—"The young, tender sprouts up to 12 inches or so in length are gathered in the mountains as they appear, and are then boiled and dried. The price is about 40s. per 100 lb. They make a convenient provision for the army. Several tons are dealt with every year in Japan, where it is used for food. To prepare for eating, soak in water for about ten hours, changing the water several times, then boil. In Japan it is stewed with soy sauce and fish gravy, but any agreeable sauce may be tried with it. It is very tender, and we think you will find it eatable." As shown, the stalks were in the form of roundish, black sticks about 10 inches in length, somewhat flexible and rather tough, and having something of a tarry odour.

Various Amaryllids.—Mr. Worsley showed specimens of the following:—

Zephyranthes candida var. *major*, a fine variety, but rather more tender than the type.

Zephyranthes rosea, a tender species, requiring almost a stove temperature, which produces seeds freely.

Leucojum (Acis) autumnale, a pretty little species, difficult to grow on account of the liking slugs have for it.

Hippeastrum brachyandrum flowers from plants raised from seed, somewhat improved upon the wild stock from Argentina.

Urceocharis Clibrani, a hybrid between *Urceolina aurea* and *Eucharis grandiflora*. The flower-buds before they open have a yellowish tinge, but afterward become pure white. The plant never produces seed.

Hippeastrum advenum.—Similar to the type, but with perianth segments about double the width. This flowered in three-and-a-half years from seed.

Lycoris squamigera.—The flowers fade very quickly if exposed to the hot sun, but retain their colour for a considerable time if cut and brought indoors.

Tritonia rosea.—A pretty species grown from bulbs gathered in the hills above Greytown.

Hybrid Cannas.—Mr. Worsley also drew attention to the fact that the hybrids raised between *Canna flaccida* × *Canna* (garden form), known as orchid-flowered cannas, were always sterile, but that there was always a much larger number of ovules in the ovary than in that of the garden cannas, a character which was also to be seen in *Canna flaccida*.

Botanical Certificate.—On the motion of Mr. C. T. Druery, seconded by Mr. G. S. Saunders, it was resolved:

"That the Chairmen and Secretaries of the Orchid, Floral, Fruit, and Narcissus Committees of the R.H.S. be invited to confer with Dr. Masters and Mr. Chittenden as to the status of the Botanical Certificate with a view to defining the grounds upon which that award should be made."

SCIENTIFIC COMMITTEE, SEPTEMBER 12, 1905.

Mr. G. MASSEE, V.M.H., in the Chair, and five members present.

Abies amabilis, diseased.—Mr. Bartlett, of Pencarrow Gardens, Cornwall, sent specimens and a photograph of this tree badly affected by *Chermes abietis*. There is no effectual remedy, as spraying is practically useless.

Potatoes, diseased.—Mr. G. S. Saunders, sent some tubers, received from allotment gardens near Liverpool, badly attacked by *Ædomyces leptoides*. As each tuber contains a mass of spores which are readily disseminated, the tubers should be burnt, and no potatoes again planted on the same soil.

Apple, variety.—Dr. Bonavia forwarded some remarkably dark crimson-coloured apples. They were borne by a double-flowering tree, and had the strange name *Pyrus Niedzwetzkyana*, B.M. t. 7975.

Liliaceæ, diseased.—Mr. Güssow showed microscopic specimens of *Botrytis cinerea*, which he had found attacking the lily of the valley, white lily [*Lilium candidum*?], Solomon's seal, tulips and snowdrops. The fungus appeared to be identically the same on each plant, not having developed any "biological forms."

Viola, sp. cleistogamous.—Mr. Worsley showed pods from species of violets. Prof. Henslow observed that it is suggested that as the flowering season declines, and the foliage is developed in the violets, flowers are produced on the runners, but they bear no corollas. In warmer regions, as Liguria, violets bear no cleistogamous buds, while the conspicuous flowers are fertile, whereas these latter are barren in England. Hence the presence of the cleistogamous buds appears to be a matter of compensation. (Henslow, "Origin of Floral Structures," pp. 257, 258.)

Orchids.—Mr. Odell showed sprays of two fine orchids, one from South Africa, *Satyrium carneum*; the other from North India, *Anthogonium gracile*.

SCIENTIFIC COMMITTEE, SEPTEMBER 26, 1905.

Mr. G. MASSEE, V.M.H., in the Chair, and seven members present.

Galls on Willow-leaves.—Mr. Holmes, F.L.S., sent some willow-leaves from Yeovil having galls upon them. Mr. Saunders, F.L.S., reported: "These galls are formed by the grub of a sawfly, *Nematus gallicola*. It is a very common insect, and makes galls on leaves of various kinds of willow, *Salix fragilis*, *Caprea*, *cinerea*, and *alba* being the species it mostly infests. The insect pupates in the ground. One point of interest about this gall is that it is of equal size on either side of the leaf, whereas most galls on leaves are formed almost entirely on one surface."

Cherry Sawfly.—Mr. Saunders reported as follows upon this pest sent from Bournemouth: "The insects attacking the cherry-leaves are the grubs of the 'cherry or pear sawfly' (*Eriocampa limacina*). The grubs are commonly known by the name of cherry or pear slugworms, according to the tree they are found on. When the grubs have attained their full

growth they drop to the ground and bury themselves between 3 and 4 inches from the surface. The most certain way of destroying this insect is therefore to remove the soil under the trees to the depth of 3 or 4 inches, and burn it or bury it deeply. If this operation is carried out properly there should be no sawflies next year to lay their eggs on the leaves unless some come from a neighbour's garden. To destroy the grubs, the leaves should be sprayed with paraffin emulsion or 'Paris green' (Blundell's paste is the best), 1 oz. kept well mixed in 12 gallons of water. This should be applied in as fine a spray as possible, and the leaves not wetted so that they drip."

Stocks Dying.—Some stocks in a very unhealthy condition, with withered leaves and drooping flowers, were shown from Canonbridge, N.B. Upon these Mr. Saunders reports: "I find in the soil in which the stocks were growing a number of small worms belonging to the family *Enchytræidæ*, which would account for the condition of the plant, as these worms are very injurious to the roots of many plants. They may be killed by soaking the soil with lime-water. Plants in pots which are infested by these worms should be very carefully handled when on the potting-bench, to prevent any of the soil remaining on the bench, which might contaminate any fresh soil which might be there or placed there afterwards. The infested soil should be burnt or baked, or spread where poultry and other birds can scratch it over and pick out the worms."

Diseased Leaves of Sikkim Rhododendron.—Mr. Saunders reported that these were evidently attacked by fungus, and they were referred to Mr. Güssow for examination.

Double Peach.—Mr. Worsdell showed a double fruit from a purple-leaved peach which had been growing in the open in a dry place. Both parts of the fruit had split. Mr. Gordon observed that the splitting of peaches appeared often to be the result of a sudden supply of water after a season of comparative drought. Other members remarked that the splitting of the fruit was usually accompanied by the imperfect formation of the stone. Mr. Worsley said that since giving a dressing of lime to his peach-trees he found that the stones were always well formed, whereas before the stones were frequently imperfect.

Remarkable Abundance of Lenticels on Apples.—Mr. Saunders drew attention to a shoot of apple on which the lenticels were remarkably numerous and of large size. The trees which showed this peculiarity were growing in an orchard which had borne little fruit, but had produced much wood.

Brachystelma Barberiæ.—Mr. F. W. Moore, of the Royal Botanic Gardens, Glasnevin, sent a specimen of this remarkable asclepiad from South Africa.

Scilla hæmorrhoidalis.—Mr. Worsley showed this and the following plants from Isleworth. This plant is a native of the Grand Canary, and is remarkable for its ornamental fruits.

Hymenocallis senegambica.—This is the only Old World member of its genus, and appears to be much more hardy than the American forms.

Pellionia Daveauana.—A plant remarkably like a *Begonia*, but belonging to the *Urticaceæ*. Well figured as *Begonia Daveauana* in "Rev. Hort." 1880, 290.

Variegated Daisy.—Mr. Worsley also showed plants of *Bellis perennis* which had been cultivated apart from others for some years. When first transplanted they were variegated, but in the fresh soil regained their normal colour; they have now again become variegated. It was remarked that the variegation of plants appeared frequently to be due to the presence of a certain "enzyme" or ferment in the cells, but the means by which, and the conditions under which, this enzyme is produced do not appear to be accurately known.

Tritonia sp. nov.—Mr. Worsley also showed a plant which belongs apparently to an undescribed species, and for which he suggests the name of *T. Clusiana*. It appears to be nearly allied to *T. securigera* (= *Montbretia securigera*; = *Gladiolus securiger*), figured in the "Botanical Magazine," t. 888, but "differs in having leaves twice as long and wide; no obtuse or other indentation on the outer spathe valves, which are longer than in Redouté's figure, while the flowers all face one way. The plant was collected in the district of Greytown, South Africa, by Mr. Layton, and was cultivated at Isleworth. It seems to form a link between *Tritonia* and *Antholyza*, being hooded as in the latter genus. The scentless flowers are produced in October from the new growth of September. The plant is about one foot high."

Diseased Timber-trees.—A portion of an oak branch attacked by *Poria vaporaria*, and a specimen of the fungus of the beech (*Polyporus fomentarius*), were sent from Gerrard's Cross. It was recommended in the latter case to cut out the fungus and dress the wounds with tar, and to remove all fallen and dead timber as a means of checking the spread of the disease.

SCIENTIFIC COMMITTEE, OCTOBER 10, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, with twelve members present, and Mr. Spencer Pickering, F.R.S., visitor.

Asparagus plumosus fasciatus.—M. O'Brien, V.M.H., showed a specimen of *Asparagus plumosus fasciatus* and cristate, a peculiarity seldom met with in this species, although common in *A. officinalis*.

Cyrtanthus Bulbs, &c.—Mr. O'Brien also showed a bulb belonging to the section *Gastronema* of *Cyrtanthus*, which had been kept dry through the normal growing season. It had made an effort to grow by producing small bulbs at the end of the stolons. He also showed flowers of *Nerine sarniensis* syn. *N. venusta* and *N. O'Brieni*.

Gourd Diseased.—Mr. Odell showed a variety of gourd which was attacked by a fungus, which Mr. Massee, V.M.H., stated to be *Glaesporium sanguinolentum*, and which caused the appearance of numerous red spots on the surface of the gourd. No other variety but this had been attacked.

Decaying Potatoes.—Mr. Veitch, F.L.S., showed samples of potato which had been dug early, and packed so that air could not freely circulate. The outer part of each was quite rotten, and the decay was rapidly spreading. It was thought that the potatoes when they were dug were

already diseased, and that the conditions under which they had been stored caused the disease to develop rapidly and spread decay.

Ants Imported with Fruit.—Mr. Holmes, F.L.S., showed some ants which had been imported with bananas. Mr. Saunders, F.L.S., undertook to report on them.

Green Dahlia.—Mr. Holmes also showed specimens of this, which had a few coloured florets intermixed with the green parts. Dr. Masters, F.R.S., took the specimens to examine further.

Apple-twig Disease.—Dr. Lewis Jones sent a shoot of 'Cox's Orange Pippin' attacked by the canker fungus, *Nectria ditissima*.

Plants for Naming.—Mr. C. Watney, of Watford, sent splendid specimens of the cones of *Pinus Coulteri* from a tree 60 to 70 feet, having a girth of 9 feet 6 inches at 5 feet from the ground, the heaviest cone of which weighed 8 lb. Mr. Watney also sent a specimen of *Plumeria bicolor* ("Botanical Register," t. 480).

Beech-trees Diseased.—Specimens of diseased beech bark came from Gerrard's Cross, which Mr. Massee undertook to examine.

SCIENTIFIC COMMITTEE, OCTOBER 24, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and ten members present.

Ants Imported with Fruit.—Shown by Mr. Holmes at the last meeting, Mr. Saunders, F.L.S., reported on these. "The ants belong to the genus *Camponotus*. I do not think that there is any likelihood of their becoming a pest in this country, as probably only a few workers would from time to time be introduced, and even if both sexes, or a pregnant female, which is most unlikely, should reach these shores, it is highly improbable that they would find suitable quarters to breed in, or proper food."

Green Dahlia.—Dr. Masters, F.R.S., reported that the malformation was due to the growth of the paleæ, which had greatly enlarged and had become green, replacing the greater part of the florets.

Quince-leaves Diseased.—Mr. Massee, V.M.H., reported that these, shown by Mr. Worsley, were attacked by *Podosphæra Oxyacanthæ*.

Diseased Beech Bark.—Mr. Massee also reported that there was no fungus present in the beech bark shown at the last meeting that could be identified as the cause of the exudation which covered the bark.

Silver-leaf in Apple.—Mr. Spencer Pickering, F.R.S., showed a shoot of apple affected with the silver-leaf disease. The disease appears rarely to attack the apple, but it is too common on the plum, peach, Portugal laurel, &c. Prof. Percival considers the disease is caused by the fungus *Stereum purpureum*, since branches inoculated by him with that fungus develop silver-leaf beyond the point of attack, and the fruits of that fungus are subsequently developed on trees affected by silver-leaf disease. Mr. Pickering showed a specimen of the fungus that had developed on such a tree. He pointed out that the mycelium of the fungus evidently permeated the whole of the woody part of the tree, since a shoot of plum that had grown from a piece of root left in the ground

from a tree which had suffered from an attack of the disease developed the silver-leaf.

Variegated Cockscomb.—Mr. A. Sutton, V.M.H., showed a specimen of cockscomb, part of the inflorescence of which was white, part red, but the region in which the colours occurred was clearly defined. In the basal part of the stem the red colour of the flowers was restricted to one of the four sides, while higher up it was seen only on the opposite side, about one-fourth only of the terminal inflorescence being red, the remainder white.

Fruits.—Mr. Worsley showed a fruit of *Cucurbita ficifolia*, which, he said, was edible, and possessed no bitter flavour. He thought, since the plant was hardy and produced fruits up to 7 lb. in weight, that it might prove an acceptable addition to the edible plants grown in this country. He also showed a large fruit of a variety of capsicum (Columbus), which members recognised as the *paprika*, which is largely grown on the Continent, and which has no hot taste. The capsicum could be used green or pickled.

Orchid Disease.—Mr. Massee showed a specimen of the fungus, *Hemileia americana*, attacking leaves of *Epidendrum*, and known also on *Cattleya*. He stated that the disease was becoming very prevalent in the country.

Vine-leaves Injured.—Mr. Lynch sent specimens of vine-leaves, upon which were numerous pustules covered with a hairy growth. These were referred to Mr. Saunders.

Petals of Pelargonium Streaked.—Mr. R. Cooke, F.R.H.S., sent petals of *Pelargonium* 'Soldier's Tunic,' which had a colourless streak running down them. Dr. Masters took them to examine.

Potato Tubers with Fungus.—Mr. W. Curtis, Rainham, sent tubers of potato which had upon them patches of a reddish network, consisting of the interlacing mycelium of a fungus. The fungoid growth was entirely superficial, and could be easily rubbed off.

SCIENTIFIC COMMITTEE, NOVEMBER 7, 1905.

MR. G. MASSEE, V.M.H., in the Chair, and ten members present.

Phylloxera on Vine.—Mr. Saunders, F.L.S., reported as follows on the vine-leaves sent by Mr. Lynch from Dublin: "The vine-leaves are attacked by *Phylloxera vastatrix*. This is one of those aphides whose life-history is rather complicated. An egg is laid by one of the true females under the bark of the vine, from which in due time a wingless insect is hatched, which makes its way to a leaf on which it lays its eggs and forms a gall such as those on the leaf examined. Later on the young hatched from the eggs leave the galls and descend to the larger roots, where they multiply viviparously very rapidly for several generations. They then pass to the smaller ones, where they form small pear-shaped galls, from which individuals emerge which become winged and fly to the leaves, where, having become fully developed, the sexes pair, and the female, having found a suitable place in the bark, deposits her egg.

which is almost as large as herself. There the egg remains unhatched until the new leaves are formed. No trouble should be spared in destroying this pest. If it is attacking the roots, the best remedy is bi-sulphide of carbon injected into the soil among the roots in various places; $\frac{1}{2}$ oz. is said to be enough for one vine. All the infested leaves should be burnt as soon as they are noticed, but probably the most satisfactory thing to do would be to take up the vine and the earth near it and burn them."

Pelargonium Petals disfigured.—Dr. Masters, F.R.S., reported that the streaked appearance of the pelargonium petals shown at the last meeting was probably caused by "drip."

Curious Growth on Apple.—Dr. Masters also reported on a curious growth on a spur of an apple sent by Rev. M. O. H. Bird, which had assumed the form of a small apple, but consisted simply of a swollen "spur" about an inch in length. The shoot which had swollen bore no trace of a flower or seed.

The Web-like Covering on Potato.—Mr. Chittenden said that the curious web-like covering on the potato from Rainham was due to the growth of the fungus *Rhizoctonia violacea*. This fungus is well known on the Continent and in America as the cause of a disease of lucerne and clover, and attacks numerous other plants, among them potatoes, carrots, and asparagus. Cereals are not known to be attacked by it. In this case the fungus had attacked potatoes, following a crop of lucerne, and was confined to a strip down the field where the soil was damper than the rest, and where a much larger amount of decaying vegetable matter was present in the soil than in the remainder of the field. As Mr. Güssow remarked, there were numerous small sclerotia present under the webbing which would carry the disease over to the next year. The potatoes so attacked rapidly decayed.

Cucurbita ficifolia.—Mr. Odell, supplementing the remarks made at the last meeting by Mr. Worsley on the fruit of this plant, stated that it was edible only when young, afterwards it was of no use whatever as a vegetable, for as it became older the rind got very hard, and the placenta was much developed and pulpy.

Streptocarpus lagosensis.—Mr. Odell showed a specimen of this species recently raised by Mr. O'Brien for the first time. It is a native of West Africa, and has a tall stem, and the habit of an *Impatiens*. It appears to be a near relative of *S. Kirkii*. It bears numerous flowers of a dark purplish colour on slender pedicels. On germination two cotyledons are produced, which become separated by an internode, the lower cotyledon remaining small, while the upper develops to a large size; the internode grows upwards, and becomes fused with the developing epicotyl. On the proposition of Dr. Masters, a Botanical Certificate was awarded to this interesting plant.

Lenticels in Potato 'Evergood.'—Mr. Massee, V.M.H., showed some tubers of the potato 'Evergood' which had been grown in sterilised soil, to draw attention to the lenticels, which in this variety are very large and conspicuous. This characteristic renders the entrance of the fungi present in the soil very easy. Once in, the plant, in response to the irritation set up, forms a corky growth around the attacked spot,

which leads to a warty appearance on the tuber such as is often seen on this variety.

Crossing of Primulas.—The following letter, sent by Mr. P. Murray Thompson to Professor Henslow, was read: "For the last few years I have been interesting myself as to the influence which each of the parents has upon seedlings, and have used primroses as the basis of my experiments. I had the idea that the pollen-parent influences the colour, and this I find to be the case in all my experiments. In the first generation I did not get one plant bearing double flowers, although I had used pollen from double flowers. Saving seed from these single seedlings without any artificial fertilisation, I was surprised to find a good percentage of doubles, some of them very fine indeed; but what pleased me more was the great vigour with which they grew, compared with the old doubles which have been in commerce so long. If a repetition of my experiment should be followed by similar results, it seems to me that we ought to have a very much extended range of colours and improvement in growth of our double primroses." Mr. Douglas, V.M.H., stated that his experience coincided with that of the writer so far as the colour of the flowers of cross-bred offspring was concerned.

Hybrid Nepenthes.—Dr. Masters, F.R.S., showed a considerable number of pitchers of hybrid *Nepenthes* recently raised by M. Jarry Desloges, and commented on their peculiarities.

Abies Mariesii Fruiting.—Dr. Masters also showed a cone of *Abies Mariesii*, the first he had seen grown in this country.

"Polarity" of Growth in *Seakale*.—Mr. Chittenden showed a root-cutting of *seakale* which had been planted in the soil in an inverted position. Two buds had grown out from the lower end, and the resulting shoots had curved upwards, elongating until they reached the surface of the soil. From the other end roots had been produced which had curved downwards.

"Phyllody" in *Antirrhinum*.—Mr. Chittenden also showed an inflorescence of *Antirrhinum*, in which, instead of bearing flowers, each pedicel bore a considerable number of small bracts. The plant bearing these had been found among a batch grown for seed.

Gigantic Polypori.—Mr. Baty sent several very large specimens of *Polyporus fomentarius*, measuring 18 inches in diameter, found growing upon ash-trees at Gerrard's Cross, Bucks.

Botanical Certificates.—Dr. Masters reported the result of the conference between representatives of the various Committees upon these, and it was resolved that a sub-committee of three should be appointed to go round the exhibits and request that plants worthy of consideration should be sent up to the Scientific Committee.

SCIENTIFIC COMMITTEE, NOVEMBER 21, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eight members present.

Mealy Bug in Bananas.—From Las Palmas came specimens of an insect which "attacks both plant and fruit of bananas, particularly the

latter, at the time of the rainy season, when it seeks shelter from the rain between the fruits and eats its way into the fruit." Mr. Saunders, F.L.S., reported: "The insect is one of the 'mealy bugs,' probably *Dactylopus citri*. Paraffin emulsion will kill these insects, but how is this or any other insecticide to be applied effectually to clusters of bananas? It might be possible to tie the bunches of fruit up in bags and then introduce hydrocyanic acid gas by means of a tube from some vessel in which the gas was generated."

Fungus on Rose.—Mr. Saunders showed a shoot of rose on which was a dense whitish felt of the fungus *Sphaerotheca pannosa* (the common rose mildew). The resting spores of this fungus are formed on such permanent parts of the plants as this, while the fungus on the leaves produces only spores which germinate immediately. Mr. Saunders also showed a leaf of violet from Burmah, attacked by a fungus which Mr. Massee took to examine further.

Hardy Eucalypti.—Mr. Bowles, F.L.S., showed flowering specimens of two eucalypti which had been growing in the open air for four years at Myddelton House, Waltham Cross; *Eucalyptus cordata* ("Bot. Mag." t. 7885; Mueller, "Eucalyptographia," dec. 8, 1), a native of Tasmania, having crenulate leaves and the calyx rounded at base, and *Eucalyptus pulverulenta* ("Bot. Mag." 2087; Mueller, *l.c.* dec. 8, 7), a native of New South Wales, having entire leaves, and the calyx tube narrowed at the base.

Variation in Pears.—Dr. Masters, F.R.S., showed pears from Mr. Roupell, who sent the following communication:—" 'Beurré Rance Pear,' which bears well with me as a standard on the 'free stock,' sometimes gives traces, I think, of its ancestry by reverting to a form resembling that of the 'Catillac Pear' with a large open eye, round form and long stalk, and in some cases a flushed cheek. This deviation from the usual form occurs with a second crop which appears in unfavourable seasons, when the first bloom is cut off by spring frosts, and the abnormal fruits are borne upon the extremities of the new growths. The stalks often have buds on them, as in the specimen sent, and also thorns upon rare occasions."

Burrs on Birch.—Mr. Douglas, V.M.H., showed a specimen of birch from Great Bookham having large burrs covered with adventitious buds. Such growths are common on many kinds of trees.

Solanum tuberosum.—Dr. Masters showed a copy from the original plate of this plant drawn by Clusius in 1588, and Gerard's figures of a somewhat later date, with plates of the reputed sport from *S. Comersonii* found and cultivated by Mons. Labergerie in France. It was seen that this alleged sport bore a great resemblance to the well-known variety 'Blue Giant,' much cultivated in Germany.

Scarlet Runner Poisonous.—Mrs. Arnold, of the Lodge, Dedham, sent roots of scarlet runner with the information that a pony, after having eaten a root of this plant, had died, and another had become seriously ill after eating a portion of a root. Inquiries make it quite clear that no other root such as *Aconitum* had been mistaken for the scarlet runner, and that there could be no doubt that the roots of the scarlet runner were the cause of the trouble. Mrs. Arnold says: "I want to make it

known as much as possible, as no gardeners about here seem to know of its being poisonous, and the roots are being dug up in all directions." Mr. E. M. Holmes, F.L.S., writes as follows: "I can find no mention in books, at present, of the *Phaseolus multiflorus (coccineus)* being poisonous, but a nearly allied species, *P. lunatus*, with smaller flowers and crescent-shaped pods, is known to be poisonous to cattle. According to the 'Agric. Ledger,' 1905, No. 2, p. 13, 'a number of cases in which cattle had been poisoned as a result of eating the plant had been recorded in Mauritius, and in 1898 Mr. Bonaine showed that the whole plant produced prussic acid when ground up with water, the larger amount being obtainable from the seeds.' These beans have been investigated at the Laboratory of the Imperial Institute, and it has been proved that they yield (before being boiled, presumably) an average of 0.009 of prussic acid, but that amount may vary very widely, the cause of such variation being unknown (*l.c.*, p. 16. See 'Bull. of Imperial Institute,' 1903, vol. i. pp. 16-115). The prussic acid does not pre-exist, but is formed by the decomposition of a glucoside called phaseolunatin, by means of an enzyme, probably identical with the emulsion of bitter almonds. As the ferment is contained in separate cells, it is only when the plant is bruised or injured that the contents of the cells come in contact, and it is necessary that water should be present in order for the poison to be developed. The same arrangement occurs in the cherry laurel (*Prunus Laurocerasus*), so that the leaves may be dried and then powdered, and no prussic acid is formed until the powder is moistened, although it is readily given off when the fresh leaves (which contain water) are bruised, as every entomologist knows. This case of poisoning raises a very interesting point with regard to this familiar vegetable, viz.: 'will the bruised fresh pods of the scarlet runner yield prussic acid, and will the air-dried seeds do the same?' It is quite possible that they may be poisonous if eaten before being boiled, since boiling would destroy the enzyme, or render it inactive, so that the prussic acid would not be developed in the boiled pods. I may also point out that *Phaseolus aconitifolius*, Linn., is used as fodder for cattle, although the root is stated by Royle to be narcotic (Watt, 'Dict. Ec. Prod. India,' vi. pt. 1, p. 185). The seeds of *P. semierectus*, Linn., are used in the West Indies as a fish poison (Rosenthal, 'Pl. Diap.' p. 1019)."

SCIENTIFIC COMMITTEE, DECEMBER 5, 1905.

Dr. M. T. MASTERS, F.R.S., in the Chair, and ten members present.

Lindley Library.—Dr. Masters remarked on the fact that this was the first time the Committee had met in the room set apart for the Lindley Library, and stated that both the purchase of the library and the formation of the Scientific Committee were the outcome of the Botanical Congress of 1866, and were the two objects pointed out by Prof. A. de Candolle as desirable of attainment in the opening address at that congress.

Troublesome Weed.—An inquiry was received from Las Palmas regarding a weed known as 'juncia' or 'chufas,' which is exceedingly

troublesome in the banana plantations there. The weed has a creeping rhizome bearing numerous tuber-like growths, and spreads very rapidly. Mr. Massee, V.M.H., said : " This pest *Cyperus rotundus*, Linn., is found in nearly all tropical and sub-tropical countries. Names such as ' devil's grass,' &c., indicate its want of favour in the eyes of agriculturists. It has been long known as a pest in Madeira. Like couch-grass, this weed is not eradicated but spread by ordinary cultivation, each tuber being capable of propagating the plant. It should be removed with a fork and the roots and tubers collected."

Violet from Burmah.—Mr. Massee reported that he could find no fungus on the violet which was brought by Mr. Saunders.

Fungus on Vine-roots.—Mr. Saunders, F.L.S., showed some soil permeated with the mycelium of a fungus which had caused considerable trouble in a vine border, but in the absence of fruit it was impossible to say to which of the higher fungi it belonged.

Variegation in Hazel-leaf.—Mr. Spencer Pickering, F.R.S., showed a leaf from a hazel bush, one side of which bore a large proportion of variegated leaves. The greater part of the leaf shown was devoid of chlorophyll. He remarked upon the fact that many leaves during the past season seemed to be lacking in chlorophyll; for example, apple-leaves showed veins more clearly than usual.

Scarlet Runner Poisoning.—In connection with this question, which was raised at the last meeting, Dr. Masters pointed out that Lindley, in the "Vegetable Kingdom," p. 548, states that "the roots of *Phaseolus radiatus* are narcotic, and so are those of *P. multiflorus*, the scarlet runner kidney bean, which is recorded to have poisoned some children at Chelsea who had partaken of them." In the "Treasury of Botany," part ii. p. 874, also the following occurs : "It is worthy of notice that the roots of *Phaseolus multiflorus* are narcotic and poisonous." Mr. Holmes, F.L.S., stated that the seeds of the French bean, kidney bean, and butter bean were being analysed to discover whether any poisonous property was present in them, and a case of illness among children who had eaten a number of the seeds of the scarlet runner was mentioned.

Grapes Diseased.—Mr. Gordon, V.M.H., showed some grapes which had spots round the stalk. The trouble was restricted to one house, and the grapes had become spotted in a similar fashion for several years, subsequently decaying. There is no trace of red spider in the house.

Irritation Caused by Leaves of Californian Bay.—Canon Ellacombe, V.M.H., showed leaves of this plant, *Umbellularia californica*, and drew attention to the very pleasant scent which they emit. He stated, however, that with some people the scent caused violent sneezing and headache. He recounted the experience of a lady who, after handling the leaves, had probably got some of the juice upon her handkerchief, and so to her nose. In the evening she suffered from considerable tingling in the nose, and in the morning her face had become much swollen, particularly under the eyes. Douglas states that he could not sleep near the bush.

Electricity in Horticulture.—Canon Ellacombe also remarked on some experiments which were being carried out by a gardener in his neighbourhood with plants in relation to electricity. Wires were run

over the plots, and at intervals points projecting downwards over the plants were placed; through the wires a current of electricity was passed. An increase of 80 per cent. in the strawberry crop was reported, and a similar increase in tomatoes; but with broad beans a decrease was shown.

Colours of Seeds.—Canon Ellacombe also inquired whether it was known if the colours of seeds served any useful purpose in the life of the plant. In certain cases no doubt, as Kerner points out, the bright colour, such as is seen in *Pæonia*, *Magnolia*, and *Euonymus*, serves to render the ripe seeds attractive to birds, and so aid in their distribution, but many cases remain to be explained.

Oranges from West Indies.—Mr. Worsley drew attention to the fact that there are two well-marked varieties of oranges known as “tangerines” in this country, that are distinguished by different names in the West Indies, the form of the ordinary orange shape called the “tangerine,” and a more pyriform variety known as the “mandarin.”

Beech attacked by Scale and Fungi.—Mr. Saunders, F.L.S., reported on some specimens from Eccleshall, Notts, as follows:—“The insect on the pieces of beech bark is *Cryptococcus fagi*. It is one of the commonest and most destructive of our British *Coccidæ*, or ‘scale insects’ (but this insect and the mealy bugs and a few others do not form scales). It is widely distributed, being found in Scotland, Wales, in most parts of England, and in one locality, if not more, in Ireland. It only attacks the beech, and has not been found infesting any other kind of tree or plant, but it appears to be spreading rapidly on the beech in many parts of England. The females lay their eggs in July, and the young are hatched in the autumn or in the spring. They do not, as a rule, move far from the place of their birth, but make their way directly into some crevice in the bark and at once begin to feed on the juices of the tree, covering themselves with a white waxy secretion, which forms a felt-like mass round the insect. The stems of trees which have been infested for many years are sometimes covered with this white material which has been formed by many successive generations, to the depth of an eighth of an inch or more. Owing to its waxy nature, the rain has no effect on it. It is a curious fact that, though this insect is so common, the male is unknown. It appears to be remarkably free from natural enemies, and is seldom attacked by parasites, and the birds do not seem to eat it. When the stem of a tree is thickly coated with this insect, the best thing to do is to spread sacking or some similar material on the ground round the base of the stem, to scrape off as much of the coating as possible, and then scrub the stem with a stiff brush dipped in a paraffin emulsion, working the mixture well into the inequalities of the bark. Spraying is of no use, as it cannot be done with sufficient force to break up the felt-like mass. This remedy should be applied as soon as any sign of this insect is seen on a tree. If a stem be only slightly attacked, there is no necessity to scrape the bark before scrubbing it.” The tree was also attacked by two fungi—a species of gilled fungus which Dr. Cooke said was too immature to even guess at the genus, and by *Polyporus spumeus*.

Peach Roots Dying.—Some roots of peach were received which were in a dying condition. No insects or fungi were present, and it was

thought that the condition of the border was probably such as to account for the trouble.

Botanical Certificate.—Flowers of *Chrysanthemum indicum* were shown by Messrs. Cannell, and a Botanical Certificate was awarded to this plant, which has given rise to so many forms of value in the garden. It was introduced many years ago (1885, or perhaps prior to that).

SCIENTIFIC COMMITTEE, DECEMBER 19, 1905.

Mr. G. MASSEE, V.M.H., in the Chair, with eight members present, and Mr. W. M. Webb, F.L.S., visitor.

Big Bud in Black Currants.—Mr. de Montmorency, of Carrickmines, Dublin, sent specimens of this well-known trouble. Mr. Saunders, F.L.S., said: "The buds are attacked by the black currant bud-mite (*Eriophyes ribis*). There are not at present any living mites in them, as the buds are dead, and the mites have probably migrated to the living buds. These mites are so small that they cannot be seen without the aid of a strong magnifying-glass, so that it has been very difficult to make out their life-history; in fact, there is still something to learn. No remedy for the use of the fruit-grower has yet been discovered. The mites may be found in the living buds at all seasons of the year. They appear to migrate from the buds in which they have passed the winter to the young buds which are forming at the base of the leaves in June or July. The action of the mites feeding on the embryo leaves that they contain causes the buds to swell, and become much larger and rounder than the others. They never open properly. A large number of experiments have been made, and remedies tried without success, and various investigations are now being carried out with the hope of finding some method of stopping the ravages of these little mites. Picking off the swollen buds and burning them as soon as they are noticed is a partial remedy when the attack is slight, and if the removal of the infested buds is properly done. Spraying with the following mixture has also met with success: Mix 1 lb. of flowers of sulphur with a little water till it is about the thickness of gruel, and dissolve 12 lb. of soft soap in two gallons of water: stir the two mixtures well together, then mix in slowly enough water to make 25 gallons. Neither of these remedies, however, will free the bushes entirely from this pest. Cutting down the bushes to within 2 inches or 3 inches of the ground and dressing them with an insecticide has even proved ineffectual, for though at first the buds seemed to be all right, in the course of two or three years the mites again made their appearance. By far the best thing to do, as far as is known at present, is to burn the infested bushes, and obtain fresh ones from an untainted source, and to plant them in fresh soil. In cuttings it is not sufficient to see that there are no swollen buds on them, but they must be taken from bushes that are free from this pest. These mites are easily, and I have no doubt are frequently, carried by birds and insects from one bush to another; but if the growers of black currants would combine together, and destroy every bush that is in any degree infested with this mite, the pest might be stamped out. If combined efforts were made by neighbouring fruit-growers, many other pests, both animal and vegetable, might be practically annihilated."

Pelargonium attacked by Botrytis.—Leaves and flowers of *Pelargonium* 'Raspail' were sent from Cheshunt, and the fungus was said to "attack both old leaves and new ones as they break. I find it also attacks the flower. A 90 ft. house of the pelargoniums up to a fortnight ago looked a picture, but the plants are now suffering from disease." Mr. Massee, V.M.H., reported: "The disease is due to the presence of a fungus, *Botrytis vulgaris*, which only becomes a destructive parasite when an excess of moisture is present. Spray the plants with a solution of sulphide of potassium, 1 oz. in six gallons of water, and add 4 oz. of soft soap. Admit as much air as circumstances will allow."

Fungus in Greenhouse.—A fungus growing near the roots of *Cycas revoluta*, in a warm house, was sent from Cornwall. Mr. Massee reported: "The fungus is *Clavaria fragilis*, Fr., a British species that often appears among moss, &c., and sometimes crops up in flower-pots. It is not parasitic nor in any way injurious."

Grapes and Arums Diseased.—Mr. Massee said that no fungus was present on the grapes shown at the last meeting.

West Indian Oranges.—Mr. Worsley said that the fruit he exhibited at the last meeting under the name of "mandarin" orange does not appear to be the same as that mentioned by Rivers in Nicholson's "Gardeners' Dictionary." "He treated it as distinct from the tangerine. Yet it may be a garden form of the Chinese orange, possibly that mentioned by Rivers as grown in the Azores. This is not improbable. The seeds have long, horn-shaped ends, more developed even than in the blood orange of Malta and Palermo. The class of blood orange is also Japanese (or Chinese), and used to be imported fifty years ago to Palermo from Japanese gardens in the form of dwarf grafted trees only a few inches high. The appearance of the seeds lends colour to the view that the specimen of the mandarin we had is also of Chinese stock, even if altered in appearance (of the fruit) by new conditions. The fruit I found juicy, but more acid than the tangerine. The amount of seed points to the tree being a seedling. Nearly all the Jamaican oranges are seedlings, and this is why they are so crammed with seeds. I noticed this when in Jamaica in 1895. When they begin to garden in Jamaica they will soon produce very fine oranges."

Larch Cone with Elongated Axis.—Mr. Webb showed a cone of *Larix europæa* in which the axis had elongated beyond the scales of the cone some 3 or 4 inches. The cone was one of several similar growing on a tree near Burnham Beeches. Dr. Masters described this condition in "Veg. Teratology," p. 485.

Tomatoes in Winter.—Mr. Worsley showed some tomatoes he had gathered in the first week in October, and which had been kept in a cellar since then. He stated that it was easy to keep tomatoes in this way until the beginning of the new year, if care was taken to choose varieties which were pointed at the end where the style grows. Varieties which were open at that end very soon decay. The flavour, however, rapidly deteriorates, but the fruits remain quite good for cooking.

Magnolia Shoot with Fungus.—Miss King, of Wotton-under-Edge, sent a shoot of *Magnolia conspicua* bearing numerous red spots, the fruits of the fungus *Tubercularia vulgaris*.

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 8, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and ten members present.

Awards Recommended :—

Award of Merit.

To Pear 'Santa Claus' (votes, unanimous), from Col. Brymer, M.P., Ilslington House, Dorchester (gr. Mr. Powell). Fruit large, obovate ;

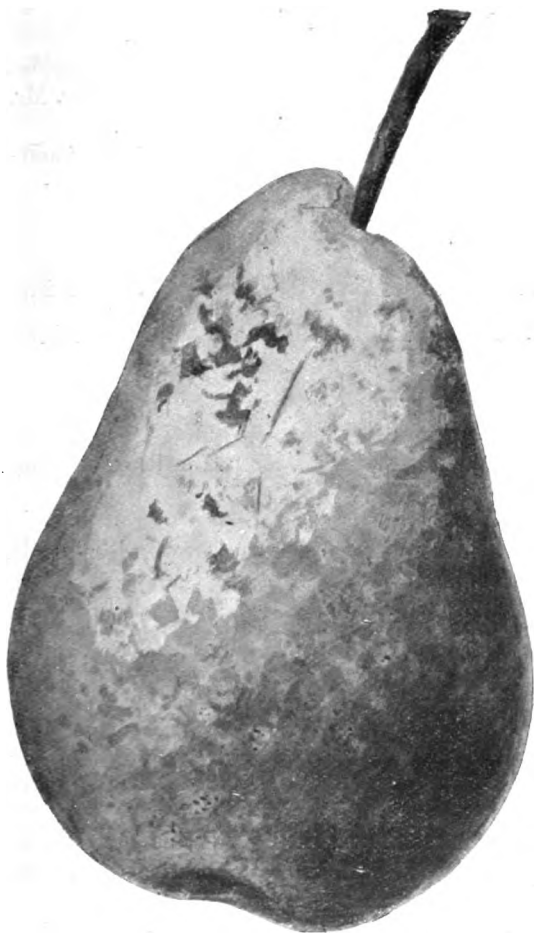


FIG. 41.—PEAR 'SANTA CLAUS.' (*Journal of Horticulture*.)

skin bronzy yellow, covered with minute brown dots, and more or less suffused with russet ; eye open, with erect segments ; stalk one inch long, thin and straight ; flesh melting, free from grit, and of excellent flavour.

H H

Col. Brymer wrote that he obtained the tree from Belgium thirty years ago.

To apple 'Lord Stradbroke' (votes, unanimous), from the Earl of Stradbroke, Henham Hall, Suffolk, (gr. Mr. Simpson). Fruit very large; skin yellow, heavily suffused with red, especially on the exposed side, and covered with small minute russet dots; eye open, with reflexed segments, set in a shallow corrugated basin; stalk very short and thick, set in a deep russet cavity. This should prove a valuable apple for cooking or exhibition. Parentage unknown.

Other Exhibits.

The Earl of Lathom, Ormskirk (gr. Mr. Ashton), sent Potato 'Earl of Lathom,' which the Committee wished should be tried at Wisley.

Lord Belper, Kingston Hall, Derby (gr. Mr. Cooke), sent a seedling Apple very similar to 'Northern Dumpling.'

Mr. Lane, Kynaston, Ross, staged two varieties of Apples.

W. Shuter, Esq., 22 Belsize Grove, Hampstead (gr. Mr. Armstrong), brought 'Black Alicante' Grapes.

Messrs. J. Veitch, Chelsea, sent Apple 'G. Wythes' and Pear 'Winter Williams.'

FRUIT AND VEGETABLE COMMITTEE, JANUARY 24, 1905.

Mr. A. H. PEARSON in the Chair, and sixteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Mr. H. J. Jones, Lewisham, for 180 varieties of Potatoes.

Silver Banksian Medal.

To Hon. W. H. Long, Rood Ashton, Trowbridge (gr. Mr. Strugnell), for thirty dishes of Apples.

Cultural Commendation.

To Mr. Wadds, gr. to Sir W. D. Pearson, Bart., M.P., Paddockhurst, for very fine Tomatoes.

Other Exhibits.

J. B. Fortescue, Esq., Dropmore, Maidenhead (gr. Mr. Page), sent large 'Roundway Magnum Bonum' Apples.

Viscount Deerhurst, Dynes Hall, Halstead (gr. Mr. Ridley), staged Potato 'Lady Deerhurst,' which the Committee wished should be tried at Wisley.

R. C. Appleton, Esq., Beverley, Yorks., sent a small collection of little-known Apples.

Mr. R. Grindrod, Whitfield, Hereford, brought Apple 'Winter Russet.'

Messrs. Lane, Berkhamstead, sent Apple 'Hallett's Seedling.'

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 14, 1905.

Mr. J. CHEAL in the Chair, and twenty members present.

Awards Recommended :—

Gold Medal.

To Messrs. Bunyard, Maidstone, for 100 dishes of Apples.

Silver-gilt Knightian Medal.

To King's Acre Nursery Co., Hereford, for seventy dishes of Apples.

Silver Banksian Medal.

To O. P. Serocold, Esq., Taplow Hill, Taplow (gr. Mr. Bullock), for 80 dishes of Apples.

Other Exhibits.

Messrs. Hartland, Cork, sent Apple 'Ard Cairn,' a small russety, sweet variety.

Mr. R. Maher, Yattendon Court Gardens, Newbury, staged three old and little-known varieties of Apples.

Mr. W. H. Chambers, 89 Kerr Street, Northampton, sent a large, late, unnamed cooking Apple of promising appearance.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 28, 1905.

Mr. J. CHEAL in the Chair, and fourteen members present.

Award Recommended :—

Silver Knightian Medal.

To Mr. J. Watkins, Withington, Hereford, for thirty-five highly coloured dishes of Apples.

Other Exhibits.

Lady Adelaide Dawnay, Bampton House, Northampton, sent Apples 'Bampton Seedling.'

Mr. J. B. Preece, Little Whitfield, Hereford, staged Apple 'Treville Fillbasket.'

Mr. J. Watkins, Hereford, staged several old but rare varieties of Apples.

Messrs. Daniels, Norwich, sent Apples 'Norwich Pippin.'

Mr. C. Mortimer, Wigmore Gardens, Dorking, brought Apple 'Burcharde's Reinette,' an old variety seldom seen.

FRUIT AND VEGETABLE COMMITTEE, MARCH 14, 1905.

Mr. A. H. PEARSON in the Chair, and seventeen members present.

Award Recommended :—

Silver Knightian Medal.

To Messrs. Cannell, Swanley, for a collection of Apples.

Other Exhibits.

Mr. Crook, Forde Abbey Gardens, Chard, sent a small collection of Apples.

Mr. P. Le Cornu, Jersey, sent Apple 'Jersey Beauty'

R. S. Eckless, Esq., Ingleside, Southampton, staged Apple 'Steward Pippin,' past its best.

Mr. A. Dean proposed and Mr. J. Cheal seconded a resolution "That all Apples should be in season and condition at the time of exhibiting before this Committee." This was carried unanimously.

FRUIT AND VEGETABLE COMMITTEE, MARCH 28, 1905.

Mr. A. H. PEARSON in the Chair, and thirteen members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To C. W. Caddick, Esq., Caradoc, Ross (gr. Mr. Roe), for thirty-two dishes of Apples.

Silver Knightian Medal.

To Messrs. Cheal, Crawley, for a collection of Apples.

Other Exhibits.

Sir Henry Peto, Bart., Cheddington Court, Crewkerne, sent large well-kept Onions.

H. H. Raschen, Esq., Sidcup, brought Apple 'Newton Pippin.'

Mr. A. Dean, Kingston-on-Thames, also brought the same variety of much finer flavour.

The Earl of Ilchester, Holland House, Kensington (gr. Mr. Dixon), sent Apples 'Cluster Golden Pippin' from a tree 150 years old.

Mr. J. Crook, Forde Abbey Gardens, sent Apple 'Sturmer Pippin.'

R. Fenn, Esq., Sulhampstead, Reading, brought Apple 'Pay the Rent.'

FRUIT AND VEGETABLE COMMITTEE, APRIL 11, 1905.

Mr. J. CHEAL in the Chair, and sixteen members present.

Awards Recommended :—

Silver Banksian Medal.

To J. B. Joel, Esq., Northaw House, Potter's Bar (gr. Mr. May), for ten baskets of Potatoes.

First-class Certificate.

To Potato 'Syon House Prolific' (votes, unanimous), from J. B. Joel, Esq., Northaw House, Potter's Bar. This fine Maincrop or late variety received an Award of Merit in 1895, and has proved such an excellent cropper, disease-resister, and good quality when cooked, on all kinds of soils, that the higher award above was granted unanimously.

Cultural Commendation.

To Mr. H. J. Dover, Langley, Slough, for fine 'Royal Sovereign' Strawberries.

Other Exhibits.

Messrs. R. Veitch, Exeter, sent the so-called 'Coreless Apple,' an old variety in Devonshire. To state that the variety is "coreless" is very incorrect, as all the cells are perfect, but there were no "pips." As the cells are the objectionable portion, this variety possesses no merits over other varieties. The fruit is of medium size, rather scented, and of poor quality.

The Hon. A. H. T. de Montmorency, the Grange, Carrickmines, Dublin, sent New Potatoes 'Sir John Llewelyn,' grown in a cool house.

Mr. J. Garland, Broadclyst, Exeter, sent Apple 'April Pippin,' past its best.

Mr. F. Collis, Bollo Lane, Chiswick, brought Rhubarb 'Collis's Ruby,' which the Committee wished should be tried in the Society's Garden.

FRUIT AND VEGETABLE COMMITTEE, APRIL 25, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

First-class Certificate.

To Potato 'The Factor' (votes, 11 for), from Messrs. Dobbie, Rothessay. Several members of the Committee stated that this variety was not only of fine quality when cooked, but also a good disease-resister, and one of the heaviest croppers on all kinds of soil, and as such worthy of the most extended cultivation.

FRUIT AND VEGETABLE COMMITTEE, MAY 9, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. J. Veitch, Chelsea, for fifty dishes of Apples and Pears.

Award of Merit.

To Rhubarb 'Hobday's Giant' (votes, 9 for), from Mr. G. Hobday, Romford, Essex. The stalks exhibited were over 3 feet long, thick, pale-red in colour; crisp, and with a very small leaf.

Cultural Commendation.

To Mr. J. Grandfield, gr. to E. A. Hambro, Esq., M.P., Hayes Place, Kent, for 'Hero of Lockinge' Melons.

To Mr. T. Chamberlain, gr. to S. Heilbut, Esq., Holyport, Maidenhead, for very fine Lettuce 'Golden Ball.'

To Messrs. Cannell, Swanley, for Pea 'Edward VII.'

Other Exhibits.

Messrs. Bunyard, Maidstone, sent a small collection of Apples.

The Earl of Ilchester, Holland House, Kensington, sent Apple 'Golden Pippin' from trees 150 years old.

Mr. S. Mortimer, Farnham, brought Cucumber 'Aristocrat,' which received an Award of Merit in 1904.

Messrs. Cannell, Swanley, sent Broccoli and Cabbage.

FRUIT AND VEGETABLE COMMITTEE, MAY 23, 1905.

Mr. A. H. PEARSON in the Chair, and fifteen members present.

Awards Recommended:—

Silver Knightian Medal.

To Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. J. Hudson, V.M.H.), for a very fine collection of pot-grown fruit.

Award of Merit.

To Cucumber 'Delicacy' (votes, unanimous), from Mr. S. Mortimer, Farnham. Raised from 'Matchless' $\times$ 'Aristocrat.' Fruits of moderate length and thickness, beautiful shape, very dark green, smooth, and with a remarkably short neck.

Cultural Commendation.

To Mr. Page, gr. to J. B. Fortescue, Esq., Dropmore, Maidenhead, for large highly coloured fruits of 'Royal Sovereign' Strawberries.

Other Exhibits.

The Earl of Portsmouth, Hurstbourne Park, Whitechurch, Hants (gr. Mr. Perry), sent large fruits of 'Royal Sovereign' Strawberries, which had suffered in transit.

Mr. J. Fitt, Welwyn, Herts, brought Early Dwarf Butter Beans.

FRUIT AND VEGETABLE COMMITTEE, MAY 30, 1905.

Inner Temple Gardens.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty-two members present.

[The Cups and Medals awarded by the Council will be found on p. xxiii.]

Awards Recommended :—

First-class Certificate.

To Peach 'Peregrine' (votes, unanimous), from Messrs. Rivers, Sawbridgeworth. This excellent peach was raised from 'Spenser' nectarine, and received an Award of Merit, August 18, 1908. Fruit large, globular, handsome, with a deep suture, skin covered with red, with much darker spots on the exposed side. Flesh melting and heavily tinged with red, clinging slightly to the stone. Flavour delicious. This will prove a valuable addition to the mid-season peaches.

To Cucumber 'Delicacy' (votes, unanimous), from Mr. S. Mortimer, Farnham. An Award of Merit was granted to this variety, May 28, 1905.

Earl Cowper, Wrest Park, Ampthill (gr Mr. Mackinley), sent Apple 'Reinette Superfine' under the name of 'Countess Cowper.'

FRUIT AND VEGETABLE COMMITTEE, JUNE 20, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :—

Silver Knightian Medal.

To the West Australian Government, for a collection of Apples, Cereals, and Wood.

Cultural Commendation.

To Mr. Beckett, gr. to Lord Aldenham, Elstree, for excellent 'British Queen' Strawberries.

Other Exhibits.

Mr. J. Crook, Forde Abbey Gardens, Chard, sent a Melon closely resembling 'Countess.'

Mr. W. R. Pierce, Canterbury, staged Strawberry 'Kentish Favourite,' which the Committee wished to be tried at Wisley.

Mr. F. Fulford, Bawdsey Manor Gardens, Woodbridge, brought Melon 'Bawdsey Hero,' past its best.

Mr. H. Parr, Trent Park Gardens, New Barnet, sent Tomato 'Trent Beauty.'

FRUIT AND VEGETABLE COMMITTEE, JULY 4, 1905.

Mr. J. CHEAL in the Chair, and twelve members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Lord Llangattock, The Hendre, Monmouth (gr. Mr. T. Coomber), for a collection of splendid 'Queen' Pineapples.

Silver Knightian Medal.

To Messrs. Bunyard, Maidstone, for a collection of Strawberries.

Silver Banksian Medal.

To Miss Adamson, South Villa, Regent's Park, N.W., for Peaches.

First-class Certificate.

To Tomato 'Sunrise' (votes, unanimous), from Messrs Carter, High Holborn. A remarkably prolific variety, that had been grown in the Society's Garden. Fruits of medium size, round, dark red colour, and averaging 10 to 12 fruits in a cluster, and the clusters very freely produced. Flavour excellent.

Award of Merit.

To Pea 'Essex Wonder' (votes, unanimous), from Mr. Hobday, Romford.

To Pea 'Green Gem' (votes, unanimous), from Messrs. Sutton, Reading.

To Pea 'Excelsior' (votes, unanimous), from Messrs. Sutton.

To Strawberry 'Bedford Champion' (votes, 10 for, 2 against), from Messrs. Laxton, Bedford. Fruit very large, roundish shape, bright red, with white flesh deeply tinged with pink, and a peculiar pleasant acid flavour. Plants exhibited were bearing a great crop of fruits.

Other Exhibits.

Mr. Sinclair, Union Street, Aberdeen, sent Potato 'Earl Marischal,' past its best.

Miss Rouquette, Bray, staged some very large Lettuces.

The Earl of Carnarvon, Highclere Castle, Newbury (gr. Mr. Pope), sent Melon 'White Gem.'

Mr. G. Penwill, Totnes, brought Raspberry 'Penwill's Champion.'

FRUIT AND VEGETABLE COMMITTEE, JULY 11, 1905.

At Chelsea.

Mr. G. BUNYARD, V.M.H., in the Chair, and eleven members present.

[The Cups and Medals awarded by the Council will be found on
page xxvii.]

There was no business before the Committee.

FRUIT AND VEGETABLE COMMITTEE, JULY 18, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Awards Recommended :—

Silver Knightian Medal.

To Mrs. Haywood, Woodhatch, Reigate (gr. Mr. Salter), for very fine
'Early Rivers' Nectarine.

Silver Banksian Medal.

To Messrs. Carter, High Holborn, W.C., for 125 distinct dishes of
Peas.

To the Marquis of Salisbury, Hatfield (gr. Mr. Norman, V.M.H.), for
splendid 'Brown Turkey' Figs.

Other Exhibits.

Messrs King, Coggeshall, staged a collection of Peas.

Messrs. R. Veitch, Exeter, sent a dish of the fruit of *Rubus Lucretia*,
very similar to the common Blackberry, but much earlier, and a heavier
bearer.

Messrs. Hobbies, Dereham, brought Red Currant 'Chevalier's
Sensation,' too much like 'Comet' to be considered distinct.

Mrs. Pollinger, Morrey Lodge, Campden Hill, sent an enormous
Cucumber of 'Improved Telegraph.'

FRUIT AND VEGETABLE COMMITTEE, AUGUST 1, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for a superb collection of Gooseberries.

Hogg Memorial Medal.

To the Marquis of Salisbury, Hatfield House, Herts. (gr. Mr. Norman,
V.M.H.), for a collection of fruit.

Silver-gilt Banksian Medal.

To Messrs. Rivers, Sawbridgeworth, for Peach 'Peregrine,' admirably
grown on pot trees.

Silver Knightian Medal.

To Messrs. Dobbie, Rothesay, for thirty-seven dishes of early Potatoes.

Other Exhibits.

H. A. Lord, Esq., Lilley Brook, Charlton Kings, sent huge fruits of Melon 'Lilley Brook.' The Committee asked for smaller fruits to be sent.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 15, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Hogg Memorial Medal.

To Miss Adamson, South Villa, Regent's Park (gr. Mr. Kelf), for a collection of fruit.

Silver-gilt Knightian Medal.

To Messrs. Bunyard, Maidstone, for a collection of Apples.

Silver Knightian Medal.

To the Duke of Fife, East Sheen Lodge (gr. Mr. Mountford), for a magnificent dish of 'Violette Hâtive' Peaches.

First-class Certificate.

To Peach 'Violette Hâtive' (votes, 8 for, 4 against), from Mr. Mountford, gr. to the Duke of Fife, East Sheen Lodge. This is a very old variety, also known as 'English Galande,' and so universally grown as to need no description.

Award of Merit.

To Potato 'May Queen' (votes, unanimous), from Messrs. Hurst and Messrs. Sutton.

To Potato 'Epicure' (votes, 8 for, 4 against), from Messrs. Sutton.

To Potato 'British Queen' (votes, unanimous), from Mr. J. F. Williamson, Summer Hill, Mallow, Cork.

To Potato 'Rouge Royale' (votes, 7 for, 1 against), from Messrs. Dobbie.

To Potato 'Ideal' (votes, 8 for), from Mr. G. Carter, School Lane, Cottenham.

To Tomato 'Satisfaction' (votes, 10 for), from Messrs. Sutton.

To Tomato 'Princess of Wales' (votes, 10 for), from Messrs. Sutton.

To Tomato 'New Dwarf Red' (votes, 12 for), from Messrs. Jas. Veitch.

To Tomato 'Yellow Cherry' (votes, 10 for), from Messrs. Jas. Veitch.

To Tomato 'Fillbasket' (votes, 9 for, 1 against), from Messrs. Laxton.

To Tomato 'Norfolk Hero' (votes, 11 for), from Mr. G. W. Miller, Wisbech.

To Tomato 'Holmes' Supreme' (votes, 12 for), from Messrs. Barr and Messrs. Hurst.

All the above had been grown in the Society's Garden at Wisley.

To Pea 'The Bell' (votes, unanimous), from Messrs. Bell and Bieberstedt, Leith. A very productive variety, with large, handsome pods, filled with about nine large delicious peas. Height $4\frac{1}{2}$ feet.

To Pea 'The Scotsman' (votes, unanimous), from Messrs. Bell and Bieberstedt. Another prolific variety with handsome tapering pods filled with fine-flavoured peas. Height about 4 feet.

Other Exhibits.

Mr. Power, Abbey Gardens, Banbury, sent Cucumber 'Power's Supreme.'

Mr. W. Carpenter, The Mount, Yardley Wood, sent Tomato 'Carpenter's Superior,' which the Committee wished should be sent to Wisley for trial.

Messrs. Cross, Wisbech, sent Potato 'Dalmeny Radium,' which the Committee also wished should be sent to Wisley for trial.

Mr. Crook, Forde Abbey Gardens, Chard, staged Apricots.

Mr. Colwill, Sidmouth, sent Raspberry 'Red Diamond,' which the Committee did not consider superior to existing varieties.

Mr. A. Perry, Winchmore Hill, staged *Rubus sorbifolius*.

Mr. Scarlett, Edinburgh, brought several new varieties of Potatoes.

Mr. A. Huckfield, Pershore, sent Plum 'Evesham Industry,' raised from 'Prince Engelbert' × 'Rivers Prolific.'

FRUIT AND VEGETABLE COMMITTEE, AUGUST 29, 1905.

Mr. J. CHEAL in the Chair, and ten members present.

Awards Recommended :—

Hogg Memorial Medal.

To Messrs. Bunyard, Maidstone, for fruit trees in pots.

Silver Banksian Medal.

To the Duke of Fife, East Sheen Lodge (gr. Mr. Mountford), for a collection of fruit.

To R. Hoffman, Esq., Tower House, Streatham (gr. Mr. Tomlinson), for Apple trees in pots.

To J. Stroode Coysh, Esq., 28 Woodville Gardens, Ealing, for very fine fruits of Apple 'Lady Sudeley.'

To Miss Adamson, South Villa, Regent's Park (gr. Mr. Kelf), for large highly coloured Peaches.

Cultural Commendation.

To Mr. G. Gumbrell, The Lodge, Widbury, Ware, for large beautifully coloured fruits of Pear 'Clapp's Favourite.'

To Mr. Winstanley (gr. to Sir Pryse Pryse, Bart.), Gogerddan, Cardiganshire, for exceptionally fine Lemons grown on the back wall of a vinery.

Other Exhibits.

Mr. W. Crump, V.M.H. (gr. to Earl Beauchamp), Madresfield Court, Malvern, sent some branches of Plum trees bearing an extraordinary crop of fruit; also Melon 'Penrhyn Hero,' not quite ripe.

Hon. A. H. de Montmorency, The Grange, Carrickmines, Dublin, sent a seedling Peach.

Messrs. Abbott, Ardleigh, Essex, staged Cucumbers.

Mr. C. Engelmann, Saffron Walden, brought a Runner Bean under the name of 'Firefly,' which proved to be an old variety.

A. H. Heath, Esq., M.P., Newbold Revel, Rugby (gr. Mr. Cheffins), sent Melon 'Newbold Selected,' not quite "up to the mark" in flavour.

Messrs. R. Veitch, Exeter, sent Plum 'Burbank,' a pleasant-flavoured variety, but its hardiness is doubtful. It was requested that a tree be sent to Wisley.

H. A. Attenborough, Esq., Catesby House, Daventry (gr. Mr. Child), sent Melon 'Catesby Hero,' not quite ripe.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 12, 1905.

Mr. O. THOMAS, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Cannell, Swanley, for Onions and Cabbage.

Silver Banksian Medal.

To Miss Adamson, South Villa, Regent's Park (gr. Mr. Kelf), for a collection of Melons.

To Captain A. E. Speer, Sandown Lodge, Esher (gr. Mr. Perry), for a collection of Gourds.

To H. F. Walker, Esq., Highley Manor, Balcombe (gr. Mr. Coles), for a collection of fruit.

Bronze Banksian Medal.

To G. Gumbrell, Esq., The Lodge, Widbury, Ware, for vegetables and fruit.

Award of Merit.

To Plum 'September Prolific' (votes, unanimous), from Mr. W. Poupart, Marsh Farm, Twickenham. A remarkably prolific variety, coming into use after 'Victoria' and 'Pond's Seedling' are over, and should prove valuable for private use or market. The fruit is very similar to 'Jefferson' both in size and appearance, and suitable for cooking only.

Cultural Commendation.

To Messrs. Harrison, Leicester, for vegetables.

To Messrs. J. Veitch, Chelsea, for outdoor-grown Tomatoes.

To the Royal Horticultural Society's Garden, for Cucumber, 'Carter's Ideal.'

To Mr. T. H. Slade, gr. to Lord Poltimore, Exeter, for Pear 'Michaelmas Nelis.'

Other Exhibits.

Mr. R. Pocock, Southover Grange Gardens, Lewes, sent Tomato 'Pocock's Prolific,' which the Committee wished should be tried at Wisley.

Messrs. Peed, Streatham, staged a collection of hardy fruit.

From the Royal Horticultural Society's Garden came Melons, 'Early Burlington' and 'Early Bristol,' both American varieties. The seeds were sent by Dr. Masters, F.R.S.

Mr. R. Mountford, gr. to the Duke of Fife, East Sheen, sent Peach 'Baltet.'

Mr. A. C. Roffey, 55 Church Road, Croydon, brought Cucumbers and Tomatoes.

Mr. H. Parr, Trent Park Gardens, New Barnet, staged Melon 'Trent Perfection.'

H. H. Raschen, Esq., 12 Manor Road, Sidcup, brought Apple 'Prince,' which the Committee wished to see growing next year.

Mr. R. Read, Cadbyrie House, Ealing, sent an American Runner Bean 'Golden Carmine,' the pods handsomely marked with yellow and red.

Mr. W. A. Cook, Leonardslee, Horsham, sent large fruits of Raspberry 'Belle de Fontenay.' A useful autumn-fruiting variety.

J. Cavenhill, Esq., Crichness, Bromley, sent a remarkable Gourd, 8 feet 6 inches long. If grown on a pergola, the long fruits would present a unique appearance.

S. Heilbut, Esq., Holyport, Maidenhead, staged splendid fruits of 'Ribston Pippin' Apples grown on pot trees.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 26, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Mr. Hobday, Romford, for a collection of vegetables.

To Messrs. Rivers, Sawbridgeworth, for vines in pots.

Silver Knightian Medal.

To the Marquis of Salisbury, Hatfield (gr. Mr. Norman, V.M.H.), for very fine Black Hamburg Grapes.

To H. L. Bischoffsheim, Esq., Warren House, Stanmore (gr. Mr. Ellis), for large branches, highly coloured, of Grape 'Princess of Wales.'

Silver-gilt Banksian Medal.

To the Duke of Fife, East Sheen (gr. Mr. Mountford), for hardy fruit.

Other Exhibits.

Lady Frederick Fitz Roy, Lewes, sent fruits of the old 'Blood Peach,' a variety with very dark flesh of inferior flavour.

Mr. A. E. Dann, Oaklands, Hailsham, brought a seedling Raspberry, not superior to existing varieties.

Messrs. Spooner, Hounslow, staged Apple 'The Baron,' which the Committee asked to see later.

Messrs. J. Veitch, Chelsea, sent Crab 'Brilliant.'

Mrs. P. H. Miller, Moyleen, Marlow, sent some very fine Walnuts.

Messrs. Cannell, Swanley, staged a collection of autumn-fruiting Raspberries.

Mr. W. Dann, Kelling Place Gardens, Holt, sent a large and rather coarse Tomato.

Mr. E. Beckett, Aldenham House Gardens, Elstree, brought Crab 'Beauty of Montreal.'

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 10, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty-six members present.

Awards Recommended :—

Award of Merit.

To Melon 'Conference' (votes, 15 for), from Mr. W. Birkenhaw, The Gardens, Bridehead, Dorchester. Fruit of medium size, round, heavily netted, flesh green, thick, and of excellent flavour.

To Broccoli 'Walcheren' (votes, 9 for), from Messrs. Barr, Covent Garden. A very fine stock indeed of this excellent Broccoli. This stock had been grown in the Society's Garden.

Other Exhibits.

Mr. A. H. Bull, Southborough, Tunbridge Wells, sent 'New Intermediate' Beetroots.

Colonel the Hon. C. Harvard, Gunton Park (gr. Mr. Allan), sent Pear 'Marguerite Marillat,' weighing 26 oz.

Messrs. Laxton, Bedford, sent Apple 'September Pippin.'

Mr. C. Ross, Welford Park Gardens, Newbury, brought a very promising Pear 'Margaretha,' which the Committee wished to see again.

Monsieur Chas. Baltet, Troyes, France, sent Pear 'President Roosevelt.'

Mr. W. H. Bannister, Cole House Gardens, Westbury-on-Trym, staged Pear 'Autumn Nelis,' which received a F.C.C. 1862.

Miss Howard, Beeches Green, Stroud, sent a seedling Apple raised from 'Newtown Pippin,' and, like its parent, of no value in this country.

Mr. G. Pyne, Topsham, Devon, sent Apple 'Bester's Seedling,' closely resembling 'Warner's King.'

Mr. W. Birkenhaw, Dorchester, sent Apple 'Bridehead Reliance,' identical with 'Tower of Glamis.'

Mr. H. Faulkenor, Hungerford, brought Cobnut 'Faulkner's Prolific,' and Apple 'Inkpen Beauty,' the latter identical with 'Maltster.'

Mr. G. Squibbs, Whittlebury, sent Apple 'Johnstone's Pearmain,' which the Committee asked to see later.

Mrs. Carl Jay, Blendon Hall, Bexley (gr. Mr. Humphreys), sent Apples 'Bachelor's Seedling' and 'Blendon Seedling,' the latter the same as 'Hoary Morning.'

The King's Acre Nursery Co., Hereford, staged Apple 'Shobden Seedling,' identical with 'Antonowka Poloutovafontowas.'

Mr. Miles, Aldershot, sent seedling Pears.

Mr. E. Trollope, Coombe Park Gardens, Reading, sent seedling Apples.

W. H. Woodcock, Esq., Biscovean, Cornwall, brought Apple 'Banana Pippin,' a very soft-fleshed variety.

E. W. Caddick, Esq., Caradoc, Herefordshire, staged Apple 'Caradoc Scarlet,' a handsome fruit of poor quality.

Mrs. W. H. Burn, North Mymms Park, Hatfield (gr. Mr. Fielder), sent fruits of *Akebia miniata*.

Mr. Will Tayler, Hampton, staged outdoor Grapes.

F. Bibby, Esq., Hardwicke Grange, Shrewsbury, sent Pear 'Le Brun,' which the Committee asked to see again.

H. G. Wadlow, Esq., Dogs Thorpe, Peterborough, sent Apple 'Paston.'

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 24, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty-four members present.

Awards Recommended :—

Silver Banksian Medal.

Messrs. Low, Bush Hill Park, for Apples.

To the Horticultural College, Swanley, for Melons.

Award of Merit.

To Potato 'The Gardener' (votes, unanimous), from Mr. W. H. Sinclair, 15B Union Street, Aberdeen.

To Potato 'Dalhousie Seedling' (votes, unanimous), from Messrs. Kent & Brydon, Darlington.

To Potato 'Cigarette' (votes, unanimous), from Messrs. Barr, Covent Garden.

To Potato 'Duchess of Cornwall' (votes, unanimous), from Mr. J. F. Williamson, Mallow, Cork, and Messrs. Dobbie, Rothesay.

To Potato 'Engineer' (votes, unanimous), from Mr. W. Forbes, Tullygarnett, Belfast.

Highly Commended.

To Potato 'Marvel,' from Mr. W. Forbes, Tullygarnett, Belfast.

All the above varieties of Potatoes had been grown at Wisley.

Other Exhibits.

Messrs. Vilmorin-Andrieux, 4 Quai de la Mégisserie, Paris, sent 18 varieties of Potatoes. All yellow-fleshed, rather close in texture when boiled, but of excellent flavour.

Lloyd H. Beseendale, Esq., Greenham Lodge, Newbury, sent Apple 'Continuity.'

Mr. T. Bennett, Knockbrox Gardens, Kirkcudbright, N.B., sent head of the Chinese Cabbage (*Brassica sinensis*).

R. Holmes, Esq., Tuckswold Farm, Norwich, brought Rhubarb 'Crimson Winter.'

Mr. T. A. Scarlett, 22 Market Street, Edinburgh, staged three varieties of Potatoes, which the Committee wished should be tried at Wisley.

Messrs. Dobbie, Rothesay, brought three varieties of Potatoes, which the Committee wished should be tried at Wisley.

A. T. Browne, Esq., Beech Holme, Cornwall, sent an unnamed Apple of no special value.

Messrs. Garaway, Bristol, sent Potato 'Glory of the West.'

Mr. J. H. Ridgewell, The Gardens, Histon, Cambridge, staged a vegetable raised from 'Winnigstadt' Cabbage × 'Cambridge Champion' Brussels Sprout, the Cabbage being the seed-parent. The stem of the plant was about 2 feet high, thickly studded with firm Sprouts, and at the apex a firm solid Cabbage weighing from 3 to 4 lb. The Committee asked for seeds to be sent to Wisley, to see if the stock was fixed.

Sir Henry B. Samuelson, Bart., Maidenhead (gr. Mr. Tidy), sent an Apple, evidently a seedling from 'Ribston Pippin,' but not so good in flavour, and softer in the flesh.

The Horticultural College, Swanley, sent Melon 'Miss Wilkinson.'

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 7, 1905.

Mr. A. H. PEARSON, in the Chair, and nine members present.

Awards Recommended :—

Silver Knightian Medal.

To Mr. G. Mount, Canterbury, for a collection of Potatoes.

Silver Banksian Medal.

To Mr. R. W. Green, Wisbech, for a collection of Potatoes.

To Mr. J. H. Ridgewell, Histon, Cambs., for a collection of vegetables.

Cultural Commendation.

To Mr. Bound, gr. to Jeremiah Colman, Esq., Gatton Park, Reigate, for a remarkably fine dish of 'Uvedale St. Germain' Pears, from a tree 91 feet across the branches.

To W. Roupell, Esq., Harvey Lodge, Roupell Park, S.W., for excellent 'Cox's Orange Pippin' Apples.

Other Exhibits.

Messrs. Low, Bush Hill Park, Middlesex, staged five dishes of new varieties of Apples.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 21, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To B. H. Hill, Esq., Newcombes, Crediton (gr. Mr. Lock), for fifty dishes of Apples and Pears.

First-class Certificate.

To Potato 'Peckover,' from Mr. W. Boyce, Wilney, Wisbech.

Award of Merit.

To Kale 'Drumhead' (votes, 10 for, 2 against), from Messrs. Carter, High Holborn. A very dwarf, handsome variety; the leaves are broad, crenated, dark green, marked with a paler colour, surrounding a medium solid heart that is of excellent flavour when cooked.

To Apple 'Star of Devon' (votes, unanimous), from Mr. J. Garland, Broadclyst, Exeter. Fruit of medium size, deep round, even in outline, the skin nearly covered with brilliant red, eye partly closed in a shallow basin; stalk thin, half inch long, set in a moderate and russet cavity. Flesh white and of pleasant flavour. The tree is said to be a shapely grower, a great bearer, and the fruit to keep until very late. A dessert or cooking variety.

To Potato 'British Hero,' from Mr. G. Carter, School Lane, Cottenham.

To Potato 'Denbigh Giant,' from Mr. R. H. Winnard, Anderton Hall, Anderton.

To Potato 'Southern Star,' from Messrs. J. Veitch, Chelsea, and Mr. F. C. Crampton, Gate House, Sissinghurst.

To Potato 'Hurst Favourite,' from Messrs. Hurst, 152 Houndsditch, London.

To Potato 'Cigarette,' from Messrs. Barr, Covent Garden, W.C.

All the above Potatoes had been grown at Wisley, and the votes were unanimous in every case.

Other Exhibits.

Mr. Johnston, Wakefield Lodge, Stony Stratford, sent Apple 'Wakefield Pippin.'

Mr. F. Marley, Maidenhead, staged a dish of Apples.

Mr. J. Hazelby, Eastham, Birkenhead, sent Apple 'Hazelby's Seedling.'

Mr. J. H. Ridgewell, Histon, Cambridge, brought several varieties of Brussels Sprouts, which the Committee wished to be tried at Wisley.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 5, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—

Hogg Memorial Medal.

To the Earl of Harrington, Elvaston Castle, Derby (gr. Mr. Goodacre), for a very fine collection of fruit.

Silver-gilt Knightian Medal.

To the Duke of Rutland, Belvoir Castle, Grantham (gr. Mr. Divers), for a collection of fruit.

To Messrs. Cannell, Swanley, for a collection of Apples.

Silver Knightian Medal.

To Messrs. Dobbie, Mark's Tey, Essex, for a collection of Potatoes.

Silver Banksian Medal.

To Mr. W. Deal, Kelvedon, for a collection of Potatoes.

To Mrs. Denison, Little Gaddesden (gr. Mr. Gentle), for a collection of Onions.

To Messrs. Massey, Spalding, for a collection of Potatoes.

Award of Merit.

To Apple 'James Kirk' (votes, 11 for, 1 against), from Messrs. Cross, Wisbech. Fruit of medium size, deep round, inclined to conical, with a flat base; eye closed, set in a shallow basin; segments long; stalk $\frac{1}{2}$ inch long, thin, set in a deep russet cavity; skin greenish-yellow, striped with red on the exposed side; flesh crisp and pleasantly acid, and should prove a good cooking variety.

To Potato 'Peacemaker' (votes, unanimous), from Messrs. Scarlett, Edinburgh. A white round variety that was of excellent quality when cooked.

Cultural Commendation.

To Mr. Clayton, gr. to Mrs. Fielden, Grimston Park, Tadcaster, for six fruits of 'Toronja' Shaddock, weighing $6\frac{1}{2}$ lb.

To Mr. Hester, gr. to Sir Walter Gilbey, Bart., Elsenham, Essex, for a fine dish of 'Ribston Pippin' Apples.

To Mr. Cook, gr. to Sir E. Loder, Bart., Leonardslee, for Mushrooms.

Other Exhibits.

Mr. J. Crook, Forde Abbey Gardens, Chard, sent 'Gros Colmar' Grapes from a vine grafted on 'West St. Peter's,' and resembling 'West St. Peter's' more than 'Gros Colmar.'

Mr. Johnstone, Wakefield Gardens, Stony Stratford, sent two dishes of seedling Apples.

Mr. B. Wright, Oakham, Rutland, sent Apple 'R. J. E. Conant,' a promising variety, which the Committee desired to see again.

Mr. Maynard, Wymondham, Norfolk, sent Apple 'Cottage Maid,' identical with 'Cobham.'

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 19, 1905.

Mr. G. BUNYARD, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

Hogg Memorial Medal.

To Messrs. J. Veitch, Chelsea, for 118 dishes of Apples and Pears.

Silver-gilt Knightian Medal.

To Mr. C. Foster, University College, Reading, for a collection of vegetables and salads.

Other Exhibits.

Messrs. Spooner, Hounslow, sent Apple 'The Baron,' past its best.

FLORAL COMMITTEE.

JANUARY 8, 1905.

Mr. H. B. MAY in the Chair, and nineteen members present.

Awards Recommended :—

Silver Flora Medal.

To Lord Aldenham, Elstree (gr. Mr. Beckett), for very fine *Euphorbia jacquiniiflora*.

To Mr. H. B. May, Edmonton, for Ferns and flowering plants.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for hardy plants.

To Messrs. Jas. Veitch, Chelsea, for tender flowering plants.

Award of Merit.

To Chrysanthemum 'Market Gold' (votes, 18 for), from Mr. Beckett, gr. to Lord Aldenham. A very free-flowering decorative Japanese variety, with semi-reflexed flowers of a deep buttercup-yellow colour.

Cultural Commendation.

To Messrs. Cannell, Swanley, for *Moschosma riparium*.

Other Exhibits.

Lord Belper, Kingston Hall, Derby (gr. Mr. Cooke), sent Chrysanthemum 'Lady Belper.'

Messrs. Low, Enfield, staged Asparagus and Cyclamen.

FLORAL COMMITTEE, JANUARY 24, 1905.

Mr. W. MARSHALL in the Chair, and twenty-six members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for forced Magnolias.

To Mr. W. Seward, Hanwell, for Cyclamen.

Silver Flora Medal.

To Messrs. Cannell, Swanley, for Primulas.

Silver Banksian Medal.

To Mr. H. B. May, Edmonton, for Ferns, &c.

To Messrs. Ambrose, Cheshunt, for Carnations and Roses.

To Messrs. Cutbush, Highgate, for alpine plants.

To Mr. W. Hayward, Kingston-on-Thames, for Chrysanthemums.

Bronze Flora Medal.

To Messrs. Ware, Feltham, for alpine plants.

Award of Merit.

To *Cotoneaster pannosa* (votes, 17 for), from Messrs. J. Veitch, Chelsea. A very pretty, graceful species from China. The leaves are small and oblong, and the fruit a dark red, borne in clusters in profusion. The growth is slender and of a graceful drooping habit.

To *Erica mediterranea hybrida* (votes, 15 for, 5 against), from Messrs. R. Veitch, Exeter. A handsome dwarf free-flowering variety, with beautiful rosy-pink flowers.

Other Exhibits.

Lady Belper, Kingston Hall, Derby (gr. Mr. Cooke), staged Chrysanthemum 'Lady Belper.'

T. F. Harrison, Esq., Hitchin (gr. Mr. Hartless), sent Carnations.

Leopold de Rothschild, Esq., Gunnersbury House (gr. J. Hudson, V.M.H.), sent *Hemanthus natalensis*.

Mrs. Alexander, Hunton, Maidstone (gr. Mr. Crane), brought *Begonia cheverensis*.

Messrs. J. Veitch, Chelsea, staged winter-flowering plants.

Lady Plowden, Aston Rowant, Oxon (gr. Mr. Clarke), sent cut conifers.

Messrs. Low, Enfield, brought Cyclamen &c.

Messrs. Barr, Covent Garden, staged spring flowers.

Miss Hopkins, Knutsford, brought spring flowers.

FLORAL COMMITTEE, FEBRUARY 14, 1905.

Mr. PAUL in the Chair, and twenty-five members present.

Awards Recommended:—*Silver-gilt Flora Medal.*

To Messrs. Sutton, Reading, for Primulas.

To Messrs. Cutbush, Highgate, for forced shrubs and alpine plants.

To Messrs. Cannell, Swanley, for Primulas.

Silver Flora Medal.

To Rev. H. Buckston, Sutton Hall, Etwall (gr. Mr. Sharnbrook), for Cyclamen.

To Mr. H. B. May, Edmonton, for foliage plants.

Silver Banksian Medal.

To Mr. W. Palmer, Andover, for Primulas.

To Messrs. Ware, Feltham, for hardy plants.

To Mr. S. Reuthe, Heston, for hardy spring flowers.

To Messrs. Hill, Edmonton, for Ferns.

To Messrs. Carter, High Holborn, for Primulas.

To Mr. K. Drost, Richmond, for Hippeastrums.

Bronze Flora Medal.

To Messrs. Cheal, Crawley, for rock plants.

Bronze Banksian Medal.

To Messrs. Jackman, Woking, for hardy flowers.

To Messrs. Ambrose, Cheshunt, for Carnations, Eucharis, &c.

Award of Merit.

Carex Vilmorini (votes, 18 for, 1 against), from Messrs. Cannell, Swanley. A most graceful plant with long narrow green leaves, which drop or recurve in an elegant form. This will prove a valuable decorative plant.

To *Primula sinensis* 'His Majesty' (votes, 16 for, 4 against), from Messrs. Sutton, Reading. A beautiful white double flower, of perfect shape, and extra large size.

To *Crocus chrysanthus* var. 'Warley' (votes, unanimous) from Miss Willmott, V.M.H., Great Warley. A very handsome variety with medium-sized flowers, which are white, with a yellow base in the centre of the flower, tinged with deep blue on the exterior, and bright red pistils.

To Rose 'Prince de Bulgarie' (votes, unanimous), from Messrs. Paul, Cheshunt. A H.T. variety of great beauty and form; the outer edges of the petals are pure white, shading to a delicate shade of pink in the centre of the flower.

Other Exhibits.

Messrs. Jas. Veitch, Chelsea, staged winter-flowering plants, and *Loropetalum chinense*.

Messrs. Peed, Streatham, brought alpine plants.

Guildford Hardy Plant Nursery, Guildford, sent hardy plants and bulbs.

Miss Hopkins, Mere Cottage, Knutsford, brought hardy flowers.

Messrs. Barr, Covent Garden, staged hardy bulbous plants.

The Hon. Mrs. Albert Brassey, Heythorp Park, Chipping Norton, sent Violet 'Countess of Caledon,' admirably grown.

Messrs. R. Veitch, Exeter, staged Ericas.

Mr. Kent, Dean House Gardens, Alresford, sent Violet 'Miss Naylor.'

G. F. Moore, Esq., Royal Botanic Gardens, Glasnevin, sent *Lachenalia*.

Mr. J. Robson, Altrincham, brought Carnation 'Flamingo.'

Miss Willmott, V.M.H., Warley Place, Great Warley, sent *Romulea rivalis*, *Iris reticulata*, and *Cyclamen ibericum* in considerable variety.

FLORAL COMMITTEE, FEBRUARY 28, 1905.

Mr. W. MARSHALL in the Chair, and twenty-two members present.

Awards Recommended:—

Gold Medal.

To Messrs. Cuthbert, Southgate, for forced flowering shrubs.

Silver-gilt Flora Medal.

To Messrs. Sutton, Reading, for Cinerarias.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for forced shrubs and alpine plants.

Silver Flora Medal.

To Messrs. Ware, Feltham, for alpine plants.

Silver Banksian Medal.

To Messrs. J. Veitch, Chelsea, for winter-flowering plants.

To Mr. H. B. May, Edmonton, for miscellaneous flowering plants.

To Mr. G. Mount, Canterbury, for Roses.

To F. D. Godman, Esq., South Lodge, Horsham, for *Rhododendron grande*.

Bronze Flora Medal.

To Messrs. Barr, Covent Garden, for hardy flowers.

To Mr. G. Reuthe, Keston, Kent, for spring flowers.

To Messrs. Cannell, Swanley, for *Eupatorium petiolare*.

Bronze Banksian Medal.

To Mr. L. R. Russell, Richmond, for forced flowering shrubs.

To Messrs. Laing, Forest Hill, for Begonias.

Messrs. Wallace, Colchester, for hardy plants.

To Miss Willmott, V.M.H., Warley Place, Great Warley, for fine forms of *Narcissus Bulbocodium* var. *monophyllus*.

Award of Merit.

To *Lachenalia* 'Jean Rogers' (votes, 17 for, 2 against), from J. T. Bennett-Poë, Esq., Holmwood, Cheshunt, and F. W. Moore, Esq., Glasnevin, Dublin. A distinct variety with exceptionally large flowers, having a pleasing red calyx on a bright orange ground. The flower-stems are remarkably long and strong.

To *Lachenalia* 'Brilliant' (votes, 15 for, 2 against), from J. T. Bennett-Poë, Esq., and F. W. Moore, Esq. The flower-stems of this variety are very short and stout, on which very large pale orange flowers are produced, tinted with red.

Cultural Commendation and Botanical Certificate.

To *Rosa gigantea* (votes, unanimous), from the Duke of Northumberland, Albury Park, Guildford (gr. Mr. Leach). This rose has proved most difficult to flower, and great credit is due to Mr. Leach for his success. The flowers are single, of great size, and a lovely shade of white.

Other Exhibits.

Messrs. Paul, Cheshunt, staged pot Roses, Lilies, &c.

Messrs. Jackman, Woking, brought alpine plants.

Miss Hopkins, Knutsford, sent spring flowers.

G. Haslett, Esq., Woodside House, Wimbledon, sent *Hippeastrums*.

Miss E. Cole, West Woodhay House, Newbury, brought *Aloe somaliensis*.

Mrs. J. Rolls Hoare, West Grinstead Park, sent Carnations.

FLORAL COMMITTEE, MARCH 14, 1905.

Mr. W. MARSHALL in the Chair, and twenty-four members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Hill, Edmonton, for Ferns.

To Messrs. Cutbush, Highgate, for alpine, herbaceous, and forced shrubs.

Silver-gilt Banksian Medal.

To Messrs. Paul, Waltham Cross, for Camellias.

Silver Flora Medal.

To Mr. S. Reuthe, Keston, for alpine plants.

To Messrs. Cannell, Swanley, for Pelargoniums and Cinerarias.

To Mr. G. Mount, Canterbury, for Roses.

To Mr. H. B. May, Edmonton, for Ferns and flowering plants.

Silver Banksian Medal.

To Messrs. J. Veitch, Chelsea, for miscellaneous flowering plants.

To Mr. L. R. Russell, Richmond, for flowering shrubs.

To Mr. S. Mortimer, Farnham, for Stocks.

To Sir W. D. Pearson, Bart., M.P., Paddockhurst, Worth (gr. Mr. Wadds), for Cyclamen.

Bronze Flora Medal.

To Messrs. Ware, Feltham, for alpine plants.

Award of Merit.

To *Heloniopsis breviscapa* (votes, 15 for, 1 against), from Messrs. Barr, Covent Garden. A perfectly hardy liliaceous plant, stated to be new, with pretty white squill-like flowers, on stems about 4 inches long. This should prove a most useful plant for early spring effects. Introduced from Japan.

To *Pulmonaria arvernensis alba* (votes, 15 for, 3 against), from Messrs. Cutbush, Highgate. A very dwarf, pure white-flowered form of the well-known blue-flowered type.

To *Adonis arvernensis* fl. pl. (votes, unanimous), from Messrs. Cutbush, Highgate. A double-flowered variety, with greenish-yellow centre florets, with the deep-yellow florets of the old variety at the margins.

To *Erica Veitchii* (votes, unanimous), from Messrs. R. Veitch, Exeter. Raised from *E. lusitanica* × *E. arborea*. This handsome variety is of a bushy habit, with masses of white flowers slightly tinged with rose,

somewhat similar to those of *E. lusitanica*, but superior both in quantity and quality, and with a much longer tube.

To *Helleborus orientalis* 'Stephen Olbrich' (votes, 15 for, 5 against), from Sir Trevor Lawrence, Bart., Burford, Dorking. Flowers large, and of a deep purple-red colour. A fine, handsome variety.

To *Cantua dependens*, syn. *buxifolia* (votes, 19 for), from H. J. Elwes, Esq., Colesbourne Park, Gloucestershire. A beautiful greenhouse plant, seldom seen, having lovely bright, rosy-pink, funnel-shaped flowers, borne in large trusses.

To Carnation 'General Kuroki' (votes, 18 for) from Messrs. Cutbush, Highgate. Flowers large, of perfect form, with a brilliant crimson colour, and slightly scented. A free variety.

Other Exhibits.

Miss Willmott, V.M.H., Warley Place, Great Warley, sent *Fritillaria discolor*, which received a First-class Certificate in 1887.

Messrs. Hobbies, Dereham, staged Rose 'Philadelphia Rambler,' a seedling from 'Crimson Rambler.' The Committee asked to see it again from the open ground.

The Hon. W. F. D. Smith, Greenlands, Henley-on-Thames, sent *Hippeastrums*.

The Earl of Ilchester, Abbotsbury Castle, Dorset, sent magnificent flowers of *Magnolia Campbelli*, also *Tecoma jasminoides*, and *Nicotiana wigandioides*.

Leopold de Rothschild, Esq., Gunnersbury Park, W. (gr. Mr. Reynolds), staged *Lathyrus pubescens*, which received an Award of Merit in 1908.

Messrs. Laing, Forest Hill, sent Begonias and Clivias.

Miss Hopkins, Mere, Knutsford, brought spring flowers.

Messrs. Jackman, Woking, staged hardy plants.

Messrs. Wallace, Colchester, brought bulbous plants.

Messrs. Sutton, Reading, sent Hyacinths

Messrs. Barr, Covent Garden, staged bulbous plants.

Messrs. Ambrose, Cheshunt, sent Carnations, &c.

Duchess Adeline of Bedford, Woodside, Rickmansworth (gr. Mr. Dickson), brought *Helleborus*.

H. Langston, Esq., Pembridge, staged Violets.

Messrs. Williams, Upper Holloway, brought alpine plants.

Mr. A. J. A. Bruce, Chorlton-cum-Hardy, sent *Sarracenias*.

Mr. J. R. Box, West Wickham, staged alpine plants.

FLORAL COMMITTEE, MARCH 28, 1905.

Mr. W. MARSHALL in the Chair, and twenty-three members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Cutbush, Highgate, for forced shrubs and alpine plants.

To Mr. J. May, Twickenham, for *Cyclamen*.

Silver-gilt Banksian Medal.

To Messrs. Cannell, Swanley, for Cinerarias and Pelargoniums.

To Messrs. Williams, Upper Holloway, for forced plants.

To Mr. G. Mount, Canterbury, for Roses.

Silver Flora Medal.

To Messrs. Cuthbert, Southgate, for forced shrubs.

To E. A. Hambro, Esq., M.P., Hayes, Kent (gr. Mr. Grandfield), for alpine plants.

Silver Banksian Medal.

To Mr. L. R. Russell, Richmond, for hardy flowering plants.

To Messrs. Gilbert, Bourne, for Anemones.

To Messrs. W. Paul, Waltham Cross, for Roses.

To St. George's Nursery Co., Hanwell, for Cyclamen.

Bronze Flora Medal.

To Mr. A. R. Upton, Guildford, for hardy plants.

To Messrs. Cripps, Tunbridge Wells, for Acers, &c.

To Mrs. Rolls Hoare, West Grinstead Park, Horsham (gr. Mr. Smith), for Violets.

Bronze Banksian Medal.

To Miss Hopkins, Knutsford, for hardy plants.

First-class Certificate.

To *Crinum Rattrayi* (votes, 15 for, 3 against), from Sir Trevor Lawrence, Bart., Burford. An exceedingly handsome variety, with long broadish leaves, which are nearly erect and 3 feet long. The flowers are produced freely on a stout stem, and of a pure white colour; the segments very broad and of much substance; the anthers are of a deep chocolate colour.

Award of Merit.

To *Crowea angustifolia* (votes, unanimous), from Messrs. J. Veitch, Chelsea. An old hardwood plant introduced from West Australia. Flowers red, produced singly, and about $\frac{1}{2}$ inch across; leaves narrow and acute. A charming cool greenhouse plant, rather difficult to grow when on its own roots, but succeeding well when grafted on *Eriostemons*.

To *Erica Wilmoreana grandiflora* (votes, 11 for, 3 against), from Messrs. Cutbush, Highgate. A glorified form of the old well-known *E. Wilmoreana*; not only are the individual flowers larger, but much more numerous than on the type.

To Carnation 'Flamingo' (votes, 8 for, 3 against), from Messrs. Ambrose, Cheshunt. A tree variety with dark red flowers of good form, sweetly scented, and no appearance of the calyx bursting.

Other Exhibits.

Messrs. R. Veitch, Exeter, sent Magnolia 'Kobus.'

W. Bryant, Esq., Stoke Park, Slough, sent *Hippeastrums*.

Miss Willmott, V.M.H., Great Warley, brought *Ranunculus Erticus*.

Mr. H. B. May, Edmonton, staged flowering plants.
 Messrs. Jackman, Woking, brought hardy plants.
 Messrs. J. Veitch, Chelsea, sent *Pyrus* and greenhouse plants.
 Messrs. Wallace, Colchester, staged hardy plants.
 Mr. H. Pulham, Elsenham, brought alpine plants.
 Messrs. Cheal, Crawley, brought rock plants.
 Messrs. Peed, Streatham, sent hardy plants.
 Messrs. Ambrose, Cheshunt, staged Roses and Carnations.
 Lady Plowden, Aston Rowant, sent Sweet Peas.
 Messrs. Turner, Slough, brought Carnations.
 Messrs. Laing, Forest Hill, staged Clivias.

FLORAL COMMITTEE, APRIL 11, 1905.

Mr. W. MARSHALL in the Chair, and twenty-one members present.

Awards Recommended :—

Gold Medal.

To Messrs. Cutbush, Highgate, for alpine and herbaceous plants.

Silver-gilt Flora Medal.

To Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. Bain), for Anthuriums.

To Messrs. Cuthbert, Southgate, for forced flowering shrubs.

To Mr. G. Mount, Canterbury, for Roses.

Silver-gilt Banksian Medal.

To Lady Harmsworth, Sutton Place, Guildford (gr. Mr. Goatley), for Cinerarias.

To Mr. A. F. Dutton, Iver, Bucks, for Carnations.

Silver Flora Medal.

To H. L. Bischoffsheim, Esq., The Warren House, Stanmore (gr. Mr. Ellis), for Anthuriums.

To Mr. H. B. May, Edmonton, for foliage Begonias and Ferns.

To Messrs. Cannell, Swanley, for Pelargoniums and Cacti.

Silver Banksian Medal.

To Messrs. Dobbie, Rothesay, for Violas.

To Messrs. Williams, Upper Holloway, for forced shrubs.

To Messrs. Jas. Veitch, Chelsea, for miscellaneous greenhouse plants.

To Sir F. T. Barry, Bart., M.P., St. Leonard's Hill, Windsor (gr. Mr. Brown), for Camellias grown in the open air.

To Messrs. Wallace, Colchester, for alpine and bulbous plants.

To Messrs. Low, Bush Hill Park, for Carnations.

To the Earl of Clarendon, The Grove, Watford (gr. Mr. Harris), for Gardenias.

Award of Merit.

To *Corydalis Wilsonii* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A new species from China, sent by Mr. E. H. Wilson, Messrs. Veitch's collector. A very dwarf-growing, free-flowering variety, with flowers of the usual form and a deep yellow colour, with a greenish base.

To Auricula 'Standard Bearer' (votes, unanimous), from Mr. J. Douglas, V.M.H., Edenside, Great Bookham. An alpine variety with well-formed, deep-purple flowers, with a white centre.

To Auricula 'Favourite' (votes, 17 for), from Mr. J. Douglas. A "self" variety of large size, perfect shape, with abundance of white "paste."

To Auricula 'Daffodil' (votes, 17 for), from Mr. J. Douglas. A lovely deep-yellow "self" flower, covered with white "paste."

To Carnation 'Harlowarden' (votes, unanimous), from Messrs. Ware, Feltham, and Mr. A. F. Dutton, Iver, Bucks. Flowers a brilliant crimson, with fringed petals, very sweetly scented, and no indications of the calyx bursting. A tree variety of American origin.

To *Anthurium Scherzerianum burfordense* (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford. This is one of the finest varieties in cultivation. The deep shining scarlet spathes are about 6 inches long and 5 inches broad.

Other Exhibits.

Isaac Lewis, Esq., Bedgebury Park, Goudhurst, sent Violet 'Miss Ethel Lewis.'

The Hon. Mrs. E. Cecil, 10 Eaton Place, S.W., sent *Anoiganthus brevifolius major*, which the Committee wished to see again. From Zululand.

H. A. Mangles, Esq., Seale, Horsham, sent hybrid Rhododendrons.

Mrs. E. Lloyd Edwards, Bryn Oerog, Llangollen, sent Primrose 'Mrs. Munro,' a large white variety.

Mr. G. Reuthe, Keston, Kent, staged *Rhododendron Aucklandii rubrum*. Mr. Reuthe stated that this red-flowered form of *R. Aucklandii* was quite hardy in Kent.

Messrs. Hobbies, Dereham, sent Rose 'Wedding Bells.'

Mr. R. Anker, Kensington, W., staged Myrtles, &c.

Mr. S. Mortimer, Rowledge, Farnham, brought Polyanthus.

Messrs. W. Paul, Waltham Cross, staged Roses.

Messrs. Gilbert, Dyke, Bourne, sent Anemones.

Miss Hopkins, Knutsford, brought spring flowers.

Messrs. Peed, Streatham, staged alpine and herbaceous plants.

Messrs. Brown, Peterborough, sent Roses.

Messrs. Jarman, Chard, brought Cinerarias.

F. A. Bevan, Esq., Trent Park, New Barnet (gr. Mr. Parr), sent Verbenas, &c.

Messrs. Jackman, Woking, staged alpine plants.

Mr. J. R. Box, West Wickham, brought Begonias.

Miss Willmott, V.M.H., Warley Place, Great Warley, sent *Anemone Hepatica triloba alba plena*.

FLORAL COMMITTEE, APRIL 25, 1905.

Mr. W. MARSHALL in the Chair, and nineteen members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To Lord Aldenham, Elstree, Herts. (gr. Mr. Beckett), for cut flowering trees and shrubs.

Silver Flora Medal.

To Messrs. Cannell, Swanley, for cut Pelargoniums.

To Messrs. Frank Cant, Colchester, for new Roses.

To Mr. H. B. May, Edmonton, for pot Roses.

To J. A. Young, Esq., Stone House, Putney (gr. Mr. Street), for Cinerarias.

Silver Banksian Medal.

To Mr. L. R. Russell, Richmond, for Clematis and flowering shrubs.

To Messrs. Smith, Worcester, for flowering plants.

To Messrs. Carter, London, for Japanese trees.

To Mr. M. Prichard, Christchurch, for spring flowers.

To Messrs. Dobbie, Rothesay, for Violas.

To Messrs. B. E. Cant, Colchester, for Roses.

To Mr. W. Taylor, Hampton, for Roses.

To Messrs. Lang, Forest Hill, for Cinerarias and Streptocarpus.

To Messrs. Wallace, Colchester, for alpine plants.

Bronze Flora Medal.

To Messrs. Low, Bush Hill Park, for Carnations, &c.

To Messrs. Jackman, Woking, for alpine plants.

To Messrs. Gilbert, Bourne, for Anemones.

To Mr. G. Reuthe, Keston, for spring flowers.

To Mr. C. Engelmann, Saffron Walden, for Sweet Peas.

First-class Certificate.

To *Meconopsis integrifolia* (votes, unanimous), from Messrs. J. Veitch, Chelsea. This magnificent meconopsis was introduced from Western China or Thibet by Messrs. J. Veitch, and is decidedly the most lovely variety we have ever seen. The flowers are large, cup-shaped, and of a delicate shade of canary-yellow, produced on stems bearing several flowers, and from 18 inches to 2 feet high; both foliage and stems are covered with light brown hairs. As the plant is quite hardy it will prove a very valuable addition to our gardens.

Award of Merit.

To *Cyrtanthus angustifolius grandiflorus* (votes, 18 for), from Miss Willmott, V.M.H., Warley Place. This is not only much larger than the type, but the colour of the flower is also much deeper and brighter, and far superior in every respect.

To Carnation 'Elizabeth' (votes, unanimous), from S. Morris, Esq., Wretham Hall, Thetford (gr. Mr. Henley). A very fragrant tree variety,

with large bright cherry-red flowers of perfect form and much substance, and non-splitting calyx. A seedling from 'America.'

Other Exhibits.

Mr. T. Leslie, Trinity Cottage, Edinburgh, sent *Rhododendron Falconeri* var. *Henryi*, which arrived in bad condition.

Mr. E. Bennett, Pirbright, staged Rose 'Lady Lily Bennett.'

Mrs. Charrington, Burys Court, Reigate, sent a curious form of *Calla Elliottiana*.

Mr. Otto Froebel, Zurich, sent the pretty *Polygala Vayredæ*, from the Spanish Pyrenees. Unfortunately it arrived too late for the Committee's inspection.

J. Whitton, Esq., City Chambers, Glasgow, sent *Rhododendron 'Anderson Henry'*, raised from *R. Griffithsii* × *R. Thomsonii*.

Messrs. Peed, Streatham, brought alpine plants.

Messrs. Cutbush, Highgate, staged Auriculas and Primulas.

Messrs. Watkins and Simpson, London, sent Wallflowers.

Messrs. Cheal, Crawley, brought alpine plants and Pansies.

Mr. Upton, Guildford, staged mossy Saxifrages.

Messrs. J. Veitch, Chelsea, sent greenhouse plants, &c.

Miss Hopkins, Knutsford, brought spring flowers.

Leopold de Rothschild, Esq., Gunnersbury (gr. Mr. J. Hudson), sent photographs of Japanese gardens.

Lady Wantage, Wantage (gr. Mr. Fyfe), sent Rose 'Fortune's Yellow.'

FLORAL COMMITTEE, MAY 9, 1905.

Mr. W. MARSHALL in the Chair, and twenty-one members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To W. M. Cazalet, Esq., Fairlawn, Tonbridge (gr. Mr. Cubberley); for *Schizanthus*.

Silver-gilt Banksian Medal.

To Messrs. Cannell, Swanley, for Pelargoniums and Roses.

To Messrs. Cutbush, Highgate, for herbaceous and flowering plants.

To Messrs. Cuthbert, Southgate, for forced shrubs.

Silver Flora Medal.

To Messrs. Carter, High Holborn, for Cinerarias.

To Messrs. J. Veitch, Chelsea, for Tulips, &c.

To Mr. M. Prichard, Christchurch, for alpine plants.

To Messrs. Ware, Feltham, for Begonias, Carnations, &c.

Silver Banksian Medal.

To Messrs. Sutton, Reading, for Wallflowers.

To Mr. J. Russell, Richmond, for Clematis.

To Messrs. Peed, Streatham, for Acers and Gloxinias.

To Mr. J. Douglas, V.M.H., Great Bookham, for Auriculas.

To Mr. G. Mount, Canterbury, for Roses.
 To Messrs. Gilbert, Bourne, for Anemones.
 To Mr. A. R. Upton, Guildford, for alpine plants.
 To Mr. A. Perry, Winchmore Hill, for hardy plants.
 To Messrs. Waterer, Bagshot, for Rhododendrons.
 To Messrs. Dobbie, Rothesay, for Pansies, Violas, and Tulips.
 To Messrs. Low, Bush Hill Park, for Carnations.

Bronze Flora Medal.

To Messrs. Turner, Slough, for Primulas and Auriculas.
 To Messrs. Cheal, Crawley, for cut flowering shrubs and rock plants.
 To Mr. Reuthe, Keston, for hardy plants.
 To Messrs. Bunyard, Maidstone, for herbaceous plants.
 To Messrs. B. R. Cant, Colchester, for Roses.
 To Mr. Polten, Cranbrook, for Roses.

Bronze Banksian Medal.

To Mr. Watts, St. Asaph, for Polyanthus.

First-class Certificate.

To *Meconopsis punicea* (votes, unanimous), from Messrs. J. Veitch, Chelsea. Flowers solitary, borne on long slender stems about 18 inches high. The flowers, which are drooping, are a dull reddish-crimson, and appear to be freely produced. This was introduced by Messrs. J. Veitch from Western China and Thibet, and their collector said the plant was perfectly hardy, never being found at a less altitude than 11,000 feet, growing in rather moist peaty soil in the mountain valleys. Perennial.

Award of Merit.

To *Primula japonica* var. *pulverulenta* (votes, 12 for, 6 against), from Messrs. J. Veitch. A new variety from Western China, and differing from the type by having smaller foliage, much serrated, and the stem and the inflorescence heavily coated with a white powder. The flowers are a deep rosy-purple.

To *Primula Veitchii* (votes, 12 for, 6 against), from Messrs. J. Veitch. A new species from Central China. This is a very handsome and distinct hardy Primula, with flower-spikes about 1 foot high, bearing a mass of red suffused with purple flowers, each flower over 1 inch across. As the plant appears to be a strong grower and remarkably floriferous, it ought to prove a great acquisition.

To *Clematis montana* var. *rubens* (votes, unanimous), from Messrs. J. Veitch. A new variety from Central China, and exactly like *C. montana* in size and form, but the flowers are a beautiful rosy-pink.

To Auricula 'Rifleman' (votes, 14 for), from Mr. J. Douglas, V.M.H., Great Bookham. A very beautiful green-edged variety.

To Auricula 'Vesta' (votes, 8 for), from Mr. J. Douglas, V.M.H. A white-edged variety, heavily suffused with powder.

To *Euphorbia Wulfeni* (votes, unanimous), from Mr. A. Perry, Winchmore Hill. A pretty variety, growing about 3 feet high, with very large trusses of pale yellow flowers.

To Carnation 'Lady Bountiful' (votes, unanimous), from Messrs. Ware, Feltham, and Mr. A. F. Dutton, Iver. A tree variety of American origin. The flowers are very large, pure white, sweetly scented, and no splitting of the calyces.

To *Pteris cretica generosa* (votes, unanimous), from Mr. H. B. May, Edmonton. A very handsome, light, graceful variety, with the fronds beautifully crested. This will be a charming fern for table decoration.

Botanical Certificate.

To *Primula tangutica* (votes, unanimous), from Messrs. J. Veitch, Chelsea. Another new species from Central China. The flowers are small, with narrow petals of a dark brown colour, and very strongly scented. The spike is about 8 inches high, bearing from five to eight flowers each. Perfectly hardy.

Other Exhibits.

Mr. S. Robinson, Sale, Cheshire, sent Auriculas.

A. W. Sutton, Esq., V.M.H., Bucklebury Place, Berks, sent the handsome *Ranunculus asiaticus*.

Messrs. Felton, Hanover Square, W., staged *Spiræa astilboides* 'Silver Sheaf.'

T. Batson, Esq., Cleveley, Blackpool, brought Auriculas.

G. Ferguson, Esq., The Hollies, Weybridge, sent *Mimulus* 'Olivia.'

N. Hayashi, Esq., Broad Street House, E.C., brought hand-painted pictures of Japanese flowers.

Sir Trevor Lawrence, Burford, Dorking, sent a few rare flowers.

J. T. Bennett-Poë, Esq., Holmwood, Cheshunt, sent a splendidly blossomed plant of *Agapetis burifolia*.

De Barri Crawshay, Esq., Rosefield, Sevenoaks, staged *Tropæolum* 'Mrs. de Barri Crawshay.'

H. Clement, Esq., 50 Sumner Road, Croydon, brought a large unnamed Pansy.

Messrs. R. Veitch, Exeter, staged a few rare plants.

Messrs. Jackman, Woking, sent hardy plants.

Messrs. Laing, Forest Hill, S.E., brought *Caladiums*.

Messrs. F. Cant, Colchester, staged new Roses.

Mr. E. Lovett, 41 Outram Road, Croydon, sent alpine window-boxes.

Messrs. Paul, Cheshunt, staged miscellaneous plants.

Mr. R. Gill, Penryn, Cornwall, brought cut *Rhododendron* blooms.

Messrs. Brown, Peterborough, sent miscellaneous flowers.

Messrs. Bull, Chelsea, staged ornamental foliage plants.

Messrs. Cripps, Tunbridge Wells, brought *Acers*, &c.

Miss Hopkins, Knutsford, sent spring flowers.

Mr. H. B. May, Edmonton, staged Zonal *Pelargoniums*.

Messrs. W. Paul, Waltham Cross, brought Roses.

Mr. Philpott, Holmwood, Surrey, sent *Rhododendron Falconeri*.

FLORAL COMMITTEE, MAY 28, 1905.

Mr. W. MARSHALL in the Chair, and seventeen members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Messrs. Cannell, Swanley, for *Calceolarias*, &c.

To Mr. G. Mount, Canterbury, for *Roses*.

Silver-gilt Banksian Medal.

To Messrs. Peed, West Norwood, for *Gloxinias* and alpine plants.

Silver Flora Medal.

To Mr. H. B. May, Edmonton, for *Gymnogrammas*.

To Mr. M. Prichard, Christchurch, for hardy flowers.

Silver Banksian Medal.

To Messrs. J. Veitch, Chelsea, for miscellaneous plants.

To Messrs. Ware, Feltham, for herbaceous flowers.

To Messrs. Cutbush, Highgate, for flowering plants.

To E. Wormald, Esq., 15 Berkeley Square, W., for *Roses*.

To Messrs. Low, Bush Hill Park, for *Carnations*, &c.

To Mr. L. R. Russell, Richmond, for *Clematis*.

Bronze Flora Medal.

To Messrs. Paul, Cheshunt, for hardy cut flowers.

To Messrs. Cripps, Tunbridge Wells, for *Acers*.

To Mr. C. G. van Tubergen, Haarlem, for *Iris*es.

To Messrs. Turner, Slough, for *Lilacs*.

First-class Certificate.

To *Clematis montana rubens* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A remarkably floriferous form of the well-known *C. montana*. The flowers are of a beautiful shade of rosy-red, quite small plants being covered with blossoms.

Award of Merit.

To *Primula vittata* (votes, 14 for, 2 against), from Messrs. J. Veitch, Chelsea. A new species from Western China, and perfectly hardy. Flower-spike nearly 2 feet high, with campanulate flowers, about $\frac{3}{4}$ inch across, and a pale purple colour. Foliage erect, narrow, and serrated.

To *Lobelia tenuior* var. *rosea* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A large-flowered form of *L. tenuior* with pale rosy flowers.

To *Iris* 'Persephone' (votes, 14 for), from Mr. C. G. van Turbergen, Haarlem. A lovely variety of the *Regelio-Cyclus* type. The flowers are of great size, with a ground colour of rich purple, and marked with intense black.

Other Exhibits.

Messrs. Bell & Sheldon, Guernsey, sent *Carnation* 'Mrs. Bertie Bell.'

J. H. Beeston, Esq., Ware (gr. Mr. Phillips), sent Carnation 'Rev. G. Hodge.'

Messrs. Smith, Darley Dale, Matlock, brought *Gentiana acaulis alba*.

Miss Wiltshire, Welwyn, Herts. (gr. Mr. Fitt), sent greenhouse plants, Lilies, &c.

Mr. R. Anker, Kensington, staged Ericas.

Mr. G. Reuthe, Keston, sent alpine plants.

Mr. A. Perry, Winchmore Hill, staged Phloxes.

Miss Hopkins, Knutsford, brought hardy flowers.

Miss Easterbrook, Fawkham, sent a basket of Sweet Peas.

Messrs. Cheal, Crawley, staged cut shrubs.

Mr. R. Rasmussen, Waltham Cross, brought Petunias.

Messrs. Sutton, Reading, sent *Primula japonica* in variety.

Martin Smith, Esq., Hayes, Kent, sent a vase of Carnations.

FLORAL COMMITTEE, MAY 30, 1905.

INNER TEMPLE GARDENS.

Mr. W. MARSHALL in the Chair, and twenty-six members present.

[For the Cups and Medals awarded by the Council, see page xxiii.]

Awards Recommended :—

Award of Merit.

To *Primula* × *Arendsi* (votes, unanimous), from Herr Geo. Arends, Ronsdorf, Germany. Raised from *P. obconica* × *P. megaseaeifolia*. Flowers a lovely mauve-pink, freely produced in large umbels, and somewhat resembling *P. obconica*, but superior to it, while the foliage is nearer to *P. megaseaeifolia*. An acquisition for the cool greenhouse.

To Rose 'Philadelphia Rambler' (votes, unanimous), from Messrs. Hobbies, Dereham. This is exactly like the well-known 'Crimson Rambler,' except that the flowers are a little larger, and a brighter and darker scarlet.

To Rose 'Lady Gay' (votes, unanimous), from Messrs. W. Paul, Waltham Cross. This is one of the loveliest Roses imaginable, and is certain to become very popular as a climbing variety. It is a Wichuraian variety, with long slender growths, literally covered with large trusses of beautiful pink double flowers.

To Rose 'David Harum' (votes, unanimous), from Messrs. Paul, Cheshunt. Flowers large, handsome, and of a charming shade of rosy-pink, suffused with a soft salmon colour. As an exhibition or bedding variety, it should prove a welcome addition to the Hybrid Tea class.

To Begonia 'Madam Granby' (votes, unanimous), from Messrs. Ware, Feltham. Flowers large, double, fine shape, and of a pretty shade of canary-yellow.

To Begonia 'Madame A. Patti' (votes, 10 for, 5 against), from Messrs. Blackmore & Langdon, Bath. A double variety, of good size and shape, and of an orange-red suffused with a darker shade.

To *Pelargonium* 'Mons. Rosaleur' (votes, unanimous), from Mr. W. J. Godfrey, Exmouth. An ivy-leaved variety, with great trusses of deep rosy-coloured flowers of good shape.

To *Pelargonium* 'The Hon. Mrs. Boyle' (votes, unanimous), from Messrs. Turner, Slough. Another ivy-leaved variety, with large double flowers of a soft palish pink shade, very floriferous, and strong habit of growth.

To *Sarracenia flava gigantea* (votes, 9 for), from Mr. A. J. Bruce, Chorlton-cum-Hardy. One of the strongest-growing varieties, the growths being over 2½ feet high, green, except near the apex and the "lid," both of which are veined with dull red.

To *Rhododendron aureum* (votes, unanimous), from Messrs. Cutbush, Highgate. A hardy variety, with large, distinct, pale yellow flowers.

To *Verbena* 'The King' (votes, unanimous), from Messrs. Cutbush. This is a glorified form of the popular variety 'Miss Willmott,' the flowers being larger, and a little deeper in colour.

To *Edraianthus pumila* (votes, 12 for, 2 against), from Messrs. Cutbush. A rare and beautiful small alpine plant, with sky-blue bell-shaped flowers, growing out of a carpet of green foliage.

To *Phlox canadensis*, Perry's variety (votes, unanimous), from Mr. A. Perry, Winchmore Hill. A very fine form of this beautiful *Phlox*, with large flowers of a pale blue colour. A striking plant for the rockery or border.

To *Rhododendron* (*Azalea*) *indica* 'Julius Roehrs' (votes, unanimous), from Messrs. Sander, St. Albans. Flowers immense, nearly 6 inches across and semi-double, brilliant crimson tinged with orange. A wonderfully showy variety.

To *Eremurus Elwesii albus* (votes, unanimous), from Mr. G. Reuthe, Keston. A pure white form of the well-known handsome *E. Elwesii*, differing from the type only in colour.

Other Exhibits.

Miss Hopkins, Knutsford, staged alpine plants.

Messrs. Reamsbottom, Glashill, Ireland, sent Anemones.

Mr. Anker, West Kensington, brought Cacti, &c.

Messrs. Brown, Peterborough, staged Roses.

Messrs. Boyes, Leicester, sent Carnations.

Mr. Crane, Highgate, brought Violas.

Messrs. Clark, Dover, sent herbaceous flowers.

Mr. Durham, Ealing, staged Calceolarias.

Messrs. Jeffries, Oxford, brought Calceolarias.

Mr. Nye, Belgrave Square, S.W., sent cut flowers.

Messrs. Pulham, Oxford Street, London, brought a rockery.

Mr. Slade, Taunton, staged Pelargoniums.

Messrs. Stanley, Southgate, sent Orchids.

Messrs. Waveren & Kruiff, Holland, brought Astilbes.

F. Wellesley, Esq., Woking, sent a few Orchids.

Messrs. Stark, Great Ryburgh, brought Tropæolums.

H. J. Elwes, Esq., Colesbourne Park, Cheltenham, brought *Bomarea edulis* var. *Elwesii*.

A. Worsley, Esq., Mandeville House, Isleworth, sent *Elisena longipetala* × *Ismene calathina*, a bigeneric hybrid with pure white flowers, with a serrated cup and small narrow segments.

FLORAL COMMITTEE, JUNE 20, 1905.

Mr. W. MARSHALL in the Chair, and thirty members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. J. Veitch, Chelsea, for Carnations and choice Shrubs.

Silver-gilt Banksian Medal.

To Mr. Eckford, Wem, Salop, for Sweet Peas.

To Messrs. Bath, Wisbech, for Pæonies.

To Lord Aldenham, Elstree (gr. Mr. Beckett), for Streptocarpus.

To Messrs. Cooling, Bath, for Roses.

Silver Flora Medal.

To Messrs. B. R. Cant, Colchester, for Roses.

To Mr. A. Perry, Winchmore Hill, for hardy flowers.

To Mr. L. R. Russell, Richmond, for stove and greenhouse plants.

To Mr. H. B. May, Edmonton, for Ixoras.

Silver Banksian Medal.

To Mr. M. Prichard, Christchurch, for hardy flowers.

To Messrs. Wallace, Colchester, for hardy flowers.

To Messrs. Kelway, Langport, for Pæonies, &c.

To Messrs. F. Cant, Colchester, for Roses.

To Messrs. Baker, Wolverhampton, for Aquilegias, &c.

To Messrs. Paul, Cheshunt, for Roses.

Bronze Flora Medal.

To Messrs. Cannell, Swanley, for Gloxinias and Aquilegias.

Bronze Banksian Medal.

To J. A. Young, Esq., Stone House, Putney (gr. Mr. Street), for Gloxinias and Streptocarpus.

Award of Merit.

To *Impatiens Holstii* (fig. 42) (votes, unanimous), from Messrs. Cannell, Swanley. A very fine variety, with large flowers, nearly two inches across; deep orange, suffused with scarlet. The habit of the plant is very bushy, strong, and shapely.

To Streptocarpus 'Royal Purple' (votes, unanimous), from Lord Aldenham, Elstree (gr. Mr. Beckett). The name aptly describes the colour of this remarkably fine variety; the flowers are of great size, and the small or large plants were equally well covered with blooms.

To Sweet Pea 'Henry Eckford' (votes, unanimous), from Mr. Eckford, Wem, Salop. Flowers very large, of perfect form, and a rich orange-scarlet colour.

To *Rodgersia pinnata alba* (votes, unanimous), from Messrs. J. Veitch, Chelsea. This is a new species from Western China. A very handsome



FIG. 42.—*IMPATIENS HOLSTII*. (*Journal of Horticulture*.)

foliage plant with large spikes of white flowers, somewhat like those of a *Spiræa*. It should prove a very useful and ornamental plant for damp situations, such as the margins of lakes. It is said to be perfectly hardy.

To Iris 'Neptune' (votes, unanimous), from Mr. G. Yeld, Clifton Cottage, York. A beautiful variety, with very large, bold flowers; the

standards of a rich, bright, pale blue, with falls of a darker shade, and a dark purple base, touched with bronze and white.

To *Aster subcæruleus* (votes, unanimous), from Mr. A. Perry, Winchmore Hill. A remarkably handsome perennial Aster, with flowers over two inches across, beautiful shape, of a pretty mauve colour, and a bright yellow disc. The growth is about two feet high, and the leaves rather broad and hairy.

To *Hemerocallis corona* (votes, 18 for, 5 against), from Mr. G. Yeld, Clifton Cottage, York. Raised from *H. flava* × *H. aurantiaca major*. A beautiful variety, with rich orange-coloured flowers.

To Pæony 'Her Grace' (votes, unanimous), from Messrs. Bath, Wisbech. Flowers double, and of a pleasing shade of pink.

To Pæony 'La Fiancée' (votes, unanimous), from Messrs. Bath, Wisbech. A pure white double flower, of perfect form.

Cultural Commendation.

To Mr. Bain, gr. to Sir Trevor Lawrence, Bart., Burford, Dorking, for *Petrea volubilis*. A climbing cool greenhouse plant of great beauty, both old and young wood bearing racemes of purplish-blue flowers.

Other Exhibits.

Messrs. Cripps, Tunbridge Wells, staged Acers and ornamental trees.

Messrs. Ware, Feltham, brought Carnations, &c.

Mr. R. Anker, Kensington, sent *Nertera depressa*.

Mr. G. Prince, Longworth, brought Roses.

Mr. R. C. Notcutt, Woodbridge, sent hardy flowers.

Mr. Yeld, York, staged Iris and *Hemerocallis*.

Messrs. Bunyard, Maidstone, brought herbaceous flowers.

Messrs. Bull, Chelsea, sent foliage plants and cut flowers.

Messrs. Barr, Covent Garden, staged Pæonies, &c.

Messrs. Peed, Streatham, sent alpine plants.

Messrs. Ladhams, Southampton, showed Pinks.

Mr. J. Douglas, V.M.H., Great Bookham, showed Iris.

Messrs. Cheal, Crawley, brought sprays of flowering trees.

Messrs. Cutbush, Highgate, sent flowering plants.

Mr. J. B. Fortescue, Dropmore, sent *Anchusa Italica*, Dropmore variety.

Messrs. Turner, Slough, staged Roses and Carnations.

Messrs. Low, Enfield, brought Carnations.

The Hon. John Boscawen, Cornwall, sent *Psoralea pinnata*.

Mr. E. Finger, Hamburg, sent *Papaver orientale* 'Princess Victoria Louise.'

Miss H. Hemus, Holdfast Hall, Worcester, staged Sweet Pea 'Paradise.'

Mr. R. Gill, Tremough Gardens, Cornwall, staged *Rhododendron cinnabarinum*.

Mr. H. Henkel, Darmstadt, sent *Erigeron speciosum roseum*.

Mrs. Blaauw, Heatherland, Bournemouth, brought Rose 'Henry II.'

Miss Violet Fellowes, Shotesham Park, Norwich, sent Lupins and Pyrethrums.

The Royal Botanic Gardens, Dublin, sent *Incarvillea variabilis*.

FLORAL COMMITTEE, JULY 4, 1905.

Mr. W. MARSHALL in the Chair, and nineteen members present.

Awards Recommended :—*Award of Merit.*

To *Eschscholtzia* 'Carmine King' (votes, unanimous), from Mr. W. H. Gardiner, Mill Street, St. Osyth. A pretty variety, with rich carmine flowers.

To *Delphinium* 'Snowflake' (votes, unanimous), from J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whitelegg). Flowers large and well formed, and pure white, except for a small blotch of green at the tip of each petal.

To *Hemerocallis* $\times$ *luteola* (votes, unanimous), from Messrs. Wallace, Colchester. Raised from *H. aurantiaca* $\times$ *H. Thunbergi*. Flower exceptionally large and of a deep orange colour, borne in large numbers on each stem.

To *Erica cinerea Boothii* (votes, unanimous), from Mrs. S. Marshall, Skelwith Fold, Ambleside. A very fine form of this handsome hardy Erica, with dark purple flowers that are produced abundantly.

To Carnation 'The Pride of Westbury' (votes, 14 for, 8 against), from Sir Samuel Scott, Westbury Manor, Bucks (gr. Mr. Tapper). A very sweet-scented border variety with large flowers of a bright red colour and the petals serrated. There was no sign of any calyx splitting.

To Carnation 'Helen, Countess of Radnor' (votes, unanimous), from Mr. J. Douglas, V.M.H., Great Bookham. Flowers sweetly scented, large, of perfect form, and a brilliant scarlet colour. A most desirable border variety.

To Rose 'Dandy' (votes, unanimous), from Messrs. Paul, Cheshunt. A Hybrid Tea variety of medium size and beautiful shape, the colour being a dark crimson suffused with a darker shade. A valuable acquisition to this class of rose for garden decoration.

Cultural Commendation.

To P. Waterer, Esq., Fawkham, Kent, for *Passiflora quadrangularis Bonapartii*.

To Mr. Clarke, gr. to Lady Plowden, Aston Rowant House, Oxon., for splendidly flowered branches of *Jacaranda mimosifolia*. It is somewhat rare for this plant to flower, and the sky-blue flowers were much admired.

Other Exhibits.

G. Ferguson, Esq., The Hollies, Weybridge (gr. Mr. Smith), sent Delphiniums and Campanulas.

Sir Cuthbert Quilter, Bart., M.P., Bawdsey Manor, Woodbridge (gr. Mr. Fulford), brought Carnation 'Lady Quilter.'

Mr. A. Fisher, Farningham Road, Tottenham, staged Ivy-leaved Pelargonium 'Miss Florence Fisher.'

Mrs. Scott-Elliot, Teviot Lodge, Hawick, sent Aquilegias.

Rev. Canon Ellacombe, Bitton Vicarage, Bristol, sent branches of *Picea orientalis* covered with cones.

R. H. Biffen, Esq., Cambridge University, staged hybrid Sweet Peas.
 Mr. W. Stacey, Dunmow, brought Verbenas.
 G. Revens, Esq., Bromley, Kent, sent Carnation 'Queen Alexandra.'
 Messrs. Dobbie, Rothesay, staged Sweet Williams.
 Messrs. Carter, High Holborn, sent Lobelia 'Imperial Double Blue.'

FLORAL COMMITTEE, JULY 11, 1905, AT CHELSEA.

Mr. W. MARSHALL in the Chair, and twenty members present.

[For the Cups and Medals awarded by the Council see p. xxvii.]

Awards Recommended :—

Award of Merit.

To *Croton edmontonense* (votes, unanimous), from Mr. H. B. May Edmonton. A graceful narrow-leaved variety, the leaves arching and twisted, marked with bright red, gold, and green, the older foliage being nearly all crimson. A very decorative variety.

To *Caladium* 'Col. John Hay' (votes, unanimous), from Messrs. Laing Forest Hill. Foliage of medium size, with a bright shining pink ground colour, covered with white blotches of various sizes.

To *Thalictrum Delavayi* (votes, unanimous), from Messrs. Wallace, Colchester. A very pretty variety, with glaucous foliage and growing about 3 feet high. The flowers are very abundant and of a beautiful lavender-blue colour. This should prove a distinct addition to hardy border plants.

To *Begonia* 'Mrs. Arthur Paget' (votes, 18 for), from Messrs. Ware, Feltham. A tuberous variety, with double flowers of a deep salmon-pink colour, shading to a pure white centre.

To *Begonia* 'Water Lily' (votes, 7 for, 1 against), from Messrs. Ware. A tuberous variety with immense white flowers, slightly tinged with green.

To Carnation 'Miss Willmott' (votes, 11 for, 4 against), from Mr. J. Douglas, V.M.H., Great Bookham. A border variety, with exceptionally large flowers of the most perfect form, no signs of any calyx splitting, and a bright cherry-red colour.

To *Betonica spicata robusta* (votes, unanimous), from Messrs. Perry, Winchmore Hill. The flowers of this variety of *Betonica* (*Stachys*) are a pleasing rosy-pink colour borne on a handsome spike, the plant is about 18 inches high, and is a hardy perennial.

Other Exhibits.

H. R. Taylor, Esq., Cheam, sent Carnation 'Rhoda.'
 Messrs. Wood, Woking, staged Rose 'Mrs. Neate.'
 Mr. Pfitzer, Stuttgart, sent *Begonia tuberosa crispa*.

FLORAL COMMITTEE, JULY 18, 1905.

Mr. W. MARSHALL in the Chair, and twenty-one members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Lady Harmsworth, Sutton Place, Guildford (gr. Mr. Goatley), for hardy flowers.

To Messrs. J. Veitch, Chelsea, for Carnations, &c.

Silver-gilt Banksian Medal.

To Mr. M. Prichard, Christchurch, for herbaceous flowers.

To Mr. Dutton, Iver, Bucks, for Carnations.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for Carnations.

To Mr. H. B. May, Edmonton, for Crotons.

To G. Ferguson, Esq., The Hollies, Weybridge (gr. Mr. Smith), for a group of *Campanula Fergusonii*.

Silver Banksian Medal.

To Messrs. Low, Bush Hill Park, for Carnations.

To Messrs. Ware, Feltham, for Carnations.

To Messrs. Cannell, Swanley, for Gloxinias and Shirley Poppies.

To Mr. J. Douglas, Great Bookham, for Carnations.

To Lady Phillimore, Campden Hill, W. (gr. Mr. Becht), for Hollyhocks.

Bronze Banksian Medal.

To Mr. H. H. Crane, Highgate, N., for Violas.

Award of Merit.

To Viola 'Councillor Watts' (votes, unanimous), from Messrs. Dobbie, Rothesay. A dwarf, compact-growing variety, with large well-formed purple flowers, borne in great profusion.

To Viola 'Dr. McFarlane' (votes, unanimous), from Messrs. Dobbie, A pretty purple-blue-coloured variety; free-flowering, dwarf and compact.

To Viola 'Isolde' (votes, unanimous), from Messrs. Dobbie. A lovely canary-yellow flower; free from rays, large, and remarkably floriferous, dwarf and compact habit.

To Viola 'Royal Sovereign' (votes, unanimous), from Messrs. Stark, Great Ryburgh. A beautiful buttercup-yellow flower, of large size and fine form; abundantly produced on dwarf compact plants.

To *Adiantum Mayii* (votes, 11 for), from Mr. H. B. May, Edmonton. A seedling raised by Mr. May from *A. fragrantissimum* and having beautiful graceful fronds with extra long pinnules; one of the most decorative varieties.

To Phlox 'Doreen' (votes, unanimous), from J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whitelegg). Flowers of great size and perfect shape; of a peculiar shade of rose tinged with salmon, with a red

ring round the eye of each flower. Raised from *P. Coquelicot* × *P. 'Henry Murger.'*



FIG. 43.—*LILIAM BUTCHUENENSE*. (*Journal of Horticulture*.)

To Carnation 'Vicountess Ebrington' (votes, unanimous), from Mr. J. Douglas, V.M.H., Great Bookham. A large, perfect flower, of a beautiful

buff colour; quite distinct, and should prove equally valuable for the border or exhibition.

To Carnation 'Liberty' (votes, 8 for), from Mr. J. Douglas, V.M.H. A border variety with large perfect flowers with a yellow ground, thickly striped with bright crimson.

To *Lilium sutchuenense* (fig. 48) (votes, unanimous), from Messrs. J. Veitch, Chelsea. A new species from Western China, with rather small flowers, with deep orange petals covered with black spots, and much recurved like those of *L. tigrinum*. The foliage is narrow lanceolate, and about 8 inches long. A slender-growing species.

To *Senecio Ligularia* var. *speciosa* (votes, 11 for), from Messrs. J. Veitch. A new species from Central China. This is apparently a sub-aquatic plant, and will prove an acquisition to this class of hardy plants; its large massive green leaves and great spikes of deep yellow flowers will make the plant a striking object.

To *Astilbe grandis* (votes, unanimous), from Messrs. J. Veitch. A new species from Western China, growing very tall; the specimens exhibited were about 7 feet high, with large pinnate leaves, and spikes of white flowers, the spike or inflorescence being 8 to 4 feet long.

Other Exhibits.

- Messrs. Cheal, Crawley, staged cut flowers.
- Messrs. Brown, Peterborough, brought Rose 'Lady Gay.'
- Messrs. Barr, Covent Garden, sent herbaceous flowers.
- Messrs. Peed, Streatham, staged Carnations.
- Messrs. Wallace, Colchester, sent cut flowers.
- Mr. G. H. G. Nye, 89 Chapel Street, S.W., brought Carnations.
- Messrs. Phillips & Taylor, Bracknell, staged Carnations.
- Miss Hopkins, Knutsford, sent hardy flowers.
- Messrs. Blackmore & Langdon, Bath, staged Carnations.
- Mr. J. F. McLeod, Roehampton, sent Croton 'Florence.'
- Mr. G. Lee, Clevedon, sent a shoot from 'Niphetos' Rose.
- Messrs. Paul, Cheshunt, brought Rose 'Cherry Ripe.'
- Mrs. Berkeley, Warley, Essex, sent *Lonicera Hildebrandtiana*, admirably flowered.

FLORAL COMMITTEE, AUGUST 1, 1905.

Mr. H. B. MAY in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

- To Messrs. Kelway, Langport, for Gladioli.
- To Messrs. James Veitch, Chelsea, for shrubs and annuals.

Silver Flora Medal.

- To Messrs. Cannell, Swanley, for annuals and Zonal Pelargoniums.
- To Mr. May, Edmonton, for Selaginellas and Bouvardias.
- To Mr. Perry, Winchmore Hill, for hardy plants.

To Mr. Prichard, Christchurch, for hardy plants.

To Percy Waterer, Esq., Fawkham, for Phlox.

To Messrs. Webb & Brand, Saffron Walden, for Hollyhocks.

Silver Banksian Medal.

To W. A. Watts, Esq., Bronwylfa, St. Asaph, for Carnations.

To Messrs. Ware, Feltham, for herbaceous plants.

To Messrs. W. Paul, Waltham Cross, for Phlox.

To Messrs. Low, Bush Hill Park, for foliage plants.

Award of Merit.

To *Centaurea moschata*, for the strain (votes, unanimous), from Messrs. Jarman, Chard. A very fine strain of the well-known 'Sweet Sultan,' the flowers being large, well formed, and of beautiful shades of colour, from pure white, yellow, through various colours to deep purple.

To *Gladiolus* 'Lady Inchiquin' (votes, 14 for), from Messrs. Kelway, Langport. Flowers and spike very large, and of a charming rosy-pink colour, shaded with orange.

To *Montbretia* 'Prometheus' (fig. 44) (votes, unanimous), from Major Petre, Westwick House, Norwich (gr. Mr. Davison). Raised from *M. Davisoni* × *M. Germania* and then crossed again with *M. Davisoni*. This is much the largest-flowered variety of *Montbretia*, each flower being about 8½ inches across, of perfect shape, and of a deep orange colour, with a red ring in the centre. The plants were exceptionally vigorous, and the inflorescence very large and branching.

To *Sambucus canadensis* (votes, unanimous), from Sir Trevor Lawrence, Bart., Dorking, and Messrs. J. Veitch, Chelsea. This variety is remarkable for its immense "heads" of white flowers, free from the usual disagreeable Elder odour. The foliage is large, much divided, and very handsome. A useful shrub for the wild garden, or shrubbery.

To *Campanula carpatica* 'White Star' (votes, unanimous), from Mr. Prichard, Christchurch. A beautiful white-flowered form of this pretty rock plant, with all the dwarfish and free-flowering properties of the type.

To *Hemerocallis* 'Dr. Regel' (votes, unanimous), from Mr. Prichard, Christchurch. A large-flowered variety, with deep bronzy-yellow flowers.

To *Spiræa Aitchisoni* (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford, Dorking, and Mr. Prichard, Christchurch. A very fine shrubby *Spiræa*, growing into a large bush, with foliage very similar to *S. Lindleyana*, and a beautiful inflorescence of white flowers. A good, vigorous grower.

To *Berberis vulgaris foliis purpureis macrophylla* (votes, 7 for, 2 against), from Messrs. Paul, Cheshunt. A very deeply coloured form of *B. vulgaris*, which should be useful for effect in the shrubbery.

To *Buddleia variabilis magnifica* (votes, 15 for, 1 against). A truly magnificent variety, the inflorescence being over two feet long, and the colour a pinkish red, with a shade of light blue. It was stated that this is a more vigorous form than the type, and that the finest flowers are produced from plants that are severely pruned. From China.

To Carnation 'Roy Morris' (votes, 12 for, 1 against), from H. W. G. Morris, Esq., Chipping Norton. A brilliant crimson flower of large size, with serrated petals, of good form, and non-splitting calyx. A rather sweet-scented border variety.



FIG. 44.—MONTBRETIA 'PROMETHEUS.' (*Journal of Horticulture*.)

Other Exhibits.

Mr. Down, Basing Park Gardens, Alton, sent Phlox 'Miss Gertrude Nicholson,' which the Committee wished to see again.

Mr. Phillips, Fust Park, Wolverhampton, sent *Calceolaria Phillipsii*.

Mr. Young, Elgin, staged Lobelia 'Queen Alexandra.'

Mr. Shoesmith, Westfield, Woking, brought Dahlias.

Messrs. Charlton, Tunbridge Wells, brought Begonias.

Martin R. Smith, Esq., Warren House, Hayes, Kent, sent Carnation
'Mrs. Shenton.'

Messrs. Barr, Covent Garden, staged hardy plants.

Messrs. Cheal, Crawley, brought Dahlias.

Mr. J. Douglas, V.M.H., Great Bookham, sent Carnations.

Messrs. Davis, Yeovil, staged Begonias.

Messrs. Gunn, Birmingham, brought Phlox.

Mr. Nye, 89 Chapel Street, S.W., sent out flowers.

Messrs. Peed, West Norwood, brought Gloxinias.

Mr. E. Polten, Cranbrook, staged Phlox and Pentstemons.

Messrs. Smith, Worcester, sent hardy plants.

Miss Tarbolton and Miss Pollard, Ashurst Wood, sent Sweet Peas.

Messrs. Bull, Chelsea, brought Caladiums.

Messrs. Laing, Forest Hill, brought stove plants.

Mr. L. R. Russell, Richmond, staged Crotons.

Mr. G. Reuthe, Keston, sent hardy plants.

FLORAL COMMITTEE, AUGUST 15, 1905.

Mr. W. MARSHALL in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Kelway, Langport, for Gladioli.

To Miss Adamson, South Villa, Regent's Park (gr. Mr. Kelf), for stove
and greenhouse plants.

Silver Flora Medal.

To Messrs. Artindale, Nether Green, Sheffield, for hardy flowers.

To Messrs. Cannell, Swanley, for Asters, &c.

To Messrs. Jas. Veitch, Chelsea, for hardy shrubs and Gloxinias.

Silver Banksian Medal.

To Mr. S. Mortimer, Farnham, for Dahlias.

To Mr. A. Perry, Winchmore Hill, for hardy flowers.

First-class Certificate.

To *Buddleia variabilis magnifica* (votes, unanimous), from Messrs.
Jas. Veitch, Chelsea. This is the finest form of the type we have seen,
the flower-spike being of unusual length and a beautiful lavender colour.
It was stated that the way to get extra fine growth and flowers is to prune
the plant very severely every year.

Award of Merit.

To Gladiolus 'French Fleet' (votes, 11 for, 2 against), from Messrs.
Kelway, Langport. The spike is of unusual size, with pretty salmon-
coloured petals, the two lower petals being heavily blotched with a
brownish purple.

To *Gladiolus* 'Peace Envoy' (votes, 13 for), from Messrs. Kelway. A charming variety with large flowers of a creamy-white shade, the lower petals being almost of a sulphur colour, marked with blue.

To *Dahlia* 'T. A. Havemeyer' (votes, 10 for, 1 against), from Messrs. Stredwick, St. Leonards. Flowers very large, with long, narrow petals, incurved, and of a bright crimson colour. Cactus.

To *Dahlia* 'William Marshall' (votes, 14 for, 2 against), from Messrs. Stredwick. A medium-sized flower of good form, and a true Cactus type, the petals being yellow at the centre and shading to salmon-buff at the points.

To *Chironia ixifera* (votes, 10 for, 4 against), from Messrs. Low, Enfield. This cool greenhouse plant from South Africa is a pretty addition to the older varieties, with similar growth and lovely bright pink flowers with prominent yellow stamens.

Other Exhibits.

Messrs. Barr, Covent Garden, staged hardy cut flowers.

Messrs. Gunn, Birmingham, brought Phlox.

Messrs. Low, Bush Hill Park, sent miscellaneous plants.

Messrs. Watkins & Simpson, Covent Garden, sent Sweet Peas.

Messrs. Bull, Chelsea, brought Hydrangeas, &c.

Messrs. Bunyard, Maidstone, sent *Eryngium Bunyardii*.

Mr. Sanders, Halton Gardens, Tring, sent Phlox.

J. Whitton, Esq., Glasgow, sent *Vallota purpurea alba*, which the Committee desired to see next year.

Miss V. Fellowes, Shotesham Park, Norwich, sent Carnations.

Mr. J. Evans, Darley Dale, staged *Gasteria Evansii*.

Mr. C. Friedrichsen, Hanworth, brought several varieties of *Fagus*.

Mr. J. Edwards, Kensal Rise, sent a dwarf *Tropeolum*.

Mr. Gibson, Easby House, Richmond, brought Carnations.

Mr. Cordingley, 85 Gracechurch Street, E.C., sent *Pelargonium* 'Rose Bud.'

Mr. Wakefield, Belmont, Uxbridge, staged Dahlias and Rudbeckias.

Lord Rothschild, Tring Park, sent a few choice *Nymphæas*.

Mr. Shoesmith, Woking, brought Dahlias.

FLORAL COMMITTEE, AUGUST 29, 1905.

Mr. W. MARSHALL in the Chair, and seventeen members present.

Awards Recommended :—

Gold Medal.

To Lord Aldenham, Elstree, Herts. (gr. Mr. Beckett), for cut flowering shrubs, Crotons, and Pentstemons.

To Messrs. J. Veitch, Chelsea, for *Nepenthes* and rare herbaceous plants.

Silver-gilt Flora Medal.

To Messrs. Cannell, Swanley, for Cannas, &c.

Silver Flora Medal.

To Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. J. Hudson, V.M.H.), for blue-flowered Nymphæas.

To Messrs. Dobbie, Rothesay, for Marigolds.

First-class Certificate.

To *Nymphaea zanzibarensis rosea* (votes, unanimous), from Lord Rothschild, Tring Park (gr. Mr. Dye). This is a lovely rosy-pink flower, with a brilliant yellow centre, differing from the type in colour only. The flower is of the largest size and sweetly scented.

To *Lilium leucanthum* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A sturdy-growing variety from Central China, about 4 feet in height, with large trumpet-shaped flowers like those of *L. japonicum Brownii*. The inside colour is pure white, with heavy shading of chocolate brown on the outside.

Award of Merit.

To Lobelia 'Kathleen Mallard' (votes, unanimous), from Mr. A. R. Mallard, Rainham. A very dwarf double-flowering sport from *L.* 'Emperor William,' with a more intense blue colour than that well-known variety. It should prove an excellent bedding variety.

To Dahlia 'Pink Perfection' (votes, unanimous), from Mr. Mortimer, Farnham. A Cactus variety of beautiful form, and of charming pink colour.

To Dahlia 'Blush Gem' (votes, unanimous), from Mr. Mortimer, Farnham. A very large show variety; the florets are white, tipped with salmon and mauve.

To Dahlia 'Daisy Easton' (votes, unanimous), from Mr. Shoesmith, Westfield, Woking. A Cactus variety of medium size, and of a bright yellow colour, and good shape.

To the strain of Pentstemons (votes, unanimous), from Lord Aldenham, Elstree (gr. Mr. Beckett). The flowers and spikes were of unusual size and of many colours. A very fine strain.

To *Stenanthium robustum* (votes, 8 for, 8 against), from Mr. A. Perry, Winchmore Hill. A bulbous plant from North America, with a flower-spike nearly two feet long, closely covered with pure white, sweetly scented flowers. A pretty and perfectly hardy border plant.

To Godetia 'Schamani flore pleno' (votes, 11 for), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain). A sturdy variety, with handsome pink double flowers of good substance. A valuable variety for borders or cutting.

To Ixora 'Mars' (votes, 14 for, 8 against), from Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. J. Hudson, V.M.H.). One of the deepest coloured varieties we have seen, raised from *I. coccinea* × *I.* 'Prince of Orange,' with a more intense colour than the first-named parent, and larger in size.

To Dahlia 'Stromboli' (votes, unanimous), from Messrs. Cheal, Crawley. A striking single variety, with rather large flowers of a deep maroon colour, each segment having a blotch of pure white.

To Dahlia 'Nelson' (votes, unanimous), from Mr. J. T. West, Brentwood. A large Cactus variety, with rich crimson flowers, slightly tinged with purple.

To Canna 'Nigra' (votes, unanimous), from Messrs. Cannell, Swanley. This is like a dwarfed and glorified form of 'Queen Charlotte,' a well-known and popular variety.

Other Exhibits.

Messrs. Barr, Covent Garden, staged hardy cut flowers.

Messrs. Peed, Streatham, brought alpine plants, &c.

Mr. J. Russell, Richmond, sent hardy Ericas.

Messrs. Cheal, Crawley, staged Dahlias.

Messrs. Paul, Cheshunt, sent Althæas, Quercus, &c.

Mr. T. R. Hayes, Keswick, sent a good form of *Erica vulgaris alba*.

Mr. Carpenter, West Hall Gardens, Byfleet, staged Cactus Dahlias.

FLORAL COMMITTEE, SEPTEMBER 12, 1905.

Mr. W. MARSHALL in the Chair, and nine members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Carter Page, 52 & 53, London Wall, E.C., for Dahlias.

Silver Flora Medal.

To Messrs. Gunn, Birmingham, for Phlox.

To Mr. J. T. West, Tower Hill, Brentwood, for Dahlias.

To Mr. M. Prichard, Christchurch, for hardy flowers.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for Dahlias.

To Mr. L. R. Russell, Richmond, for Clematis.

To Messrs. J. Veitch, Chelsea, for miscellaneous plants.

To J. Westmacott, Esq., Widbury, Ware (gr. Mr. Gumbrell), for *Asparagus Sprengeri*.

To Mr. A. Perry, Winchmore Hill, for hardy flowers.

To Mr. Gwillim, New Eltham, for Begonias.

Award of Merit.

To Dahlia 'Mrs. F. H. Cook' (votes, 7 for, 1 against), from Messrs. Cheal, Crawley. A Cactus variety of large size, broad petals, and pale scarlet colour.

To Dahlia 'Starlight' (votes, 6 for, 2 against), from Mr. H. Shoesmith, Woking. A Cactus variety of medium size, narrow petals, and a brilliant scarlet colour.

To Dahlia 'Mrs. H. Shoesmith' (votes, 6 for, 1 against), from Mr. Shoesmith. A very fine white Cactus variety of medium size and good stout flower-stem.

To Dahlia 'H. Shoesmith' (votes, unanimous), from Mr. Shoesmith. A Cactus variety of bright crimson colour, medium size, and perfect form.

To Dahlia 'Thora' (votes, unanimous), from Mr. C. Turner, Slough. A charming little Pompon variety, with flowers of a soft cream-colour, tinged with pink.

To Dahlia 'Mrs. Macmillan' (votes, unanimous), from Messrs. Stredwick, St. Leonards. A Cactus variety of the largest size, with a white centre shading to a pinkish rose at the margins. A very pretty variety.

To Dahlia 'Peach' (votes, unanimous), from Messrs. Stredwick. A Cactus variety of beautiful shape, medium size, and a rich orange-scarlet colour.

To Dahlia 'Daisy' (votes, 7 for), from Messrs. Stredwick. A Cactus variety of medium size and peculiar colour, the florets being two-thirds yellow and one-third soft pink. This should not be confused with a single variety named 'Daisy' that received an Award of Merit in 1899.

To Dahlia 'Primrose' (votes, 7 for), from Messrs. Stredwick. A well-shaped Cactus variety of a soft canary-yellow colour.

To Dahlia 'Tom Tit' (votes, 6 for), from Messrs. Stredwick. A Pompon Cactus variety, with a very small well-formed flower of a bright pink colour.

To Dahlia 'The Pilot' (votes, unanimous), from Messrs. Hobbies, Dereham. A Cactus variety of medium size, good form, and of a terracotta colour shading to yellow in the centre.

To Chrysanthemum 'Geo. Bowness' (votes, unanimous), from Messrs. Wells, Merstham. A sport from 'Madame Marie Massee,' with all the good qualities of the parent, and with flowers of a dull bronze colour.

To Chrysanthemum 'Wells Massee' (votes, unanimous), from Messrs. Wells. A beautiful white sport from 'Madame Marie Massee,' with the size and habit of the parent.

To Chrysanthemum 'Harrie' (votes, unanimous), from Messrs. Wells. A very free early-flowering Japanese variety, with deep orange-yellow flowers, lightly touched with purple.

To *Sedum spectabile atropurpureum* (votes, unanimous), from Mr. A. Perry, Winchmore Hill. A darker-coloured flower and a more vigorous-habited plant than the well-known *S. spectabile*.

To *Diervilla Saturni* (votes, unanimous), from Mr. A. Perry. A very dark crimson-flowered variety of the better-known *Weigela rosea*.

To *Sagittaria macrophylla* (votes, unanimous), from Mr. A. Perry. A large pure white-flowered variety of exceptional size and vigour, and a decided acquisition to our aquatic plants.

Other Exhibits.

Miss M. F. Sharpe, Kennetholm, Midgham, sent Gladioli.

Messrs. Peed, Streatham, staged alpine plants, &c.

Messrs. Bull, Chelsea, brought miscellaneous plants.

Messrs. Cannell, Swanley, sent Pentstemons and Dahlias.

Mr. G. H. Towndrow, Malvern Link, brought Begonia 'Bronze Beauty.'

W. H. Adams, Esq., Hockley, sent Cactus Dahlias.

Mrs. Jellings Blow, Petworth, brought 'Comet' Asters.

Mr. J. R. Pocock, Bromley, staged Dahlias.

Sir Trevor Lawrence, Bart., V.M.H., Burford, Dorking, sent Clematis 'Profusion.'

FLORAL COMMITTEE, SEPTEMBER 26, 1905.

Mr. W. MARSHALL in the Chair, and twenty-four members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Stredwick, St. Leonards-on-Sea, for Dahlias.

Silver-gilt Banksian Medal.

To Messrs. Carter Page, 52 London Wall, E.C., for Dahlias.

Silver Flora Medal.

To Messrs. Jackman, Woking, for herbaceous plants.

To Messrs. Ware, Feltham, for Roses and Dahlias.

Silver Banksian Medal.

To Messrs. Bunyard, Maidstone, for herbaceous flowers.

To Messrs. Cutbush, Highgate, for Dahlias.

To Mr. M. Prichard, Christchurch, for autumn perennials.

To Messrs. Jas. Veitch, Chelsea, for greenhouse plants.

Bronze Flora Medal.

To Messrs. Wells, Merstham, for Chrysanthemums.

To Messrs. Cheal, Crawley, for Dahlias.

First-class Certificate.

To *Rosa sericea* 'Les Grandes Épines' (votes, unanimous), from Messrs. Vilmorin, Les Barres, France. This differs from the type by having spines about an inch long, of a bright red colour, giving a striking appearance to the plant. The habit is shrubby and the flowers small, of a pure white colour. This plant should prove a valuable addition to hardy shrubs.

Award of Merit.

To *Cyrtanthus sanguineus glaucophyllus* (votes, unanimous), from Mr. J. O'Brien, Marian, Harrow-on-the-Hill. Flowers shaped like those of a hippeastrum, nearly 4 inches across, and of a deep orange-red colour, borne on stems about a foot high. A bulbous plant from the Cape.

To Chrysanthemum 'La Vestale' (votes, unanimous), from Messrs. Bath, Wisbech. A decorative variety, with white flowers of medium size, very freely produced.

To Dahlia 'Little Fred' (votes, unanimous), from Mr. H. Shoesmith, Woking. A Pompon Cactus variety, with pure white flowers of good shape.

To Dahlia 'Ivanhoe' (votes, unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A Cactus variety with rather large, deep yellow flowers of good form.

To Dahlia 'Victorian' (votes, unanimous), from Messrs. Stredwick. A large Cactus variety, the florets being striped with a mixture of white, purple, and a dark shade of maroon.

To Dahlia 'Stromboli' (votes, unanimous), from Messrs. Cheal, Crawley. A single variety with medium-sized flowers, the florets being a dark crimson, with a white blotch at the tip.

To Dahlia 'Delicacy' (votes, unanimous), from Mr. S. Mortimer, Farnham. A show variety of excellent shape and of medium size. The florets are rosy-pink with carmine tips.

To Dahlia 'Favourite' (votes, unanimous), from Mr. S. Mortimer. A show variety of large size and good shape. The colour is a beautiful soft yellow, tinged with a darker shade.

To Dahlia 'Kitty Barrett' (votes, unanimous), from Mr. J. T. West, Brentwood. A beautiful little Pompon variety with yellow florets tipped with delicate rose.

To Dahlia 'Mrs. Geo. Stevenson' (votes, unanimous), from Mr. J. T. West. A splendid pure yellow-coloured Cactus variety, of large size and perfect shape.

To Dahlia 'Cynthia' (votes, unanimous), from Mr. M. V. Seale, Sevenoaks. A very pretty rosy-pink single variety of perfect shape.

To Dahlia 'Véronique' (votes, unanimous), from Mr. M. V. Seale. A single variety with pink flowers, striped with scarlet.

To Dahlia 'Alight' (votes, unanimous), from Messrs. Burrell, Cambridge. A large Cactus variety with rich orange flowers, the florets being of beautiful shape.

To Dahlia 'Faunus' (votes, unanimous), from Messrs. Burrell. A lovely Cactus variety, the flowers are a distinct shade of fawn and of perfect shape.

To Dahlia 'Titus' (votes, unanimous), from Messrs. Burrell. A pretty little Pompon-Cactus variety, with rich yellow flowers, touched with a deeper shade.

To Dahlia 'Mrs. Macmillan' (votes, unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A large Cactus variety; the centre of the flower is white, shading to rose at the margins of the florets.

To Dahlia 'Peacemaker' (votes, unanimous), from Messrs. Keynes, Williams, Salisbury. A very shapely, handsome, pure white Pompon variety.

Other Exhibits.

Messrs. Backhouse, York, staged a collection of Colchicums.

Messrs. Bath, Wisbech, brought Dahlias and Chrysanthemums.

Messrs. Brown, Peterborough, sent Clematis and Roses.

Messrs. W. Paul, Waltham Cross, brought Roses.

Messrs. Hobbies, Dereham, staged Dahlias and Roses.

Messrs. Peed, Streatham, staged Begonias.

Mr. L. R. Russell, Richmond, brought Clematis.

Messrs. Wallace, Colchester, sent bulbous plants.

Messrs. Such, Maidenhead, brought Chrysanthemums.

Messrs. Barr, Covent Garden, staged herbaceous plants.

Messrs. Turner, Slough, sent Dahlias.

H. B. Pollard, Esq., Green Hill, Evesham, sent Aster 'St. Egwin.'

Lady Frederick Fitzroy, Balcombe, sent Rose 'Balcombe Beauty.'

Messrs. Bull, Chelsea, staged greenhouse plants.

A. Chandler, Esq., Haslemere, brought Sweet Pea 'Bobby K.'

Mr. G. H. Sage, Richmond, staged Asters.

Mrs. Denison, Little Gaddesden, Berkhamstead, sent *Grevillea Presii*.

Mrs. Haywood, Woodhatch, Reigate, sent Croton 'Miss Betty.'

Mr. T. Hobbs, Bristol, staged Dahlias.

Mr. W. H. Adams, Hockley, brought Stocks and Dahlias.

FLORAL COMMITTEE, OCTOBER 24, 1905.

Mr. W. MARSHALL in the Chair, and twenty-three members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Cannell, Swanley, for Pelargoniums.

Silver Flora Medal.

To Mr. H. B. May, Upper Edmonton, for miscellaneous plants.

To Messrs. J. Veitch, Chelsea, for winter-flowering Begonias.

Silver Banksian Medal.

To J. T. Bennett-Poë, Esq., 29 Ashley Place, S.W., for Nerines.

To J. Gurney Fowler, Esq., Glebelands, Woodford (gr. Mr. Davis), for Capsicums.

Bronze Flora Medal.

To Messrs. Cutbush, Highgate, for Asters, &c.

Award of Merit.

To Chrysanthemum 'Mrs. B. Hcoper Pearson' (votes, 12 for, 2 against), from Mr. N. Davis, Framfield. A rich yellow Japanese variety, with flowers of great size, good form, and long broad reflexed florets.

To Chrysanthemum 'Norman Davis' (votes, 7 for, 8 against), from Mr. N. Davis, Framfield. A Japanese variety, with large flowers, and crimson florets, with a bronze reverse.

To Chrysanthemum 'Mrs. A. T. Miller' (votes, unanimous), from Mr. H. J. Jones, Lewisham. A very handsome, pure white, incurved Japanese flower, with broad substantial florets.

To Chrysanthemum 'Terra-cotta Soleil d'Octobre' (votes, unanimous), from Messrs. Prickett, Tottenham. A very pretty terra-cotta coloured sport from the well-known decorative variety 'Soleil d'Octobre,' and similar in all respects except in colour.

To Chrysanthemum 'Rimmel' (votes, 16 for, 1 against), from Messrs. Cannell, Swanley. A truly charming single variety; the flower is of medium size, bright yellow, with a double row of recurved florets.

To Chrysanthemum 'Mrs. Frank Penn' (votes, 12 for, 2 against), from Mr. Fairweather, Bifrons, Canterbury. A Japanese variety of large size, intense yellow colour, and rather stiff reflexed florets.

To Carnation 'Victory' (votes, 18 for), from Messrs. Boyes, Leicester. A tree carnation with well-shaped flowers having a yellow ground, edged with rose, and slightly scented.

To Carnation 'The Cardinal' (votes, 18 for, 2 against), from Mr. C. Engelmann, Saffron Walden. A tree carnation with fiery-crimson flowers of excellent form, and fringed petals. Sweetly scented American variety.

To *Antigonon leptopus* (votes, unanimous), from Lieut.-Colonel Basil Spragge, Hoddam Castle, Ecclefechan, N.B. A lovely warm greenhouse climbing plant, with pinkish-rose flowers, borne in great profusion. This is a very difficult plant to flower as freely as the spray sent has. It requires plenty of room near the glass.

Messrs. Conway, Halifax, staged Chrysanthemum 'Autumn Glory.'

Mr. Amos Perry, Winchmore Hill, brought *Saxifraga Fortunei*.

W. G. Regden, Esq., Queenswood, Egham, sent Chrysanthemums.

Mr. J. Sherratt, Burton-on-Trent, sent Chrysanthemum 'Mrs. Sherratt.'

Mr. W. Seward, The Firs, Hanwell, sent Chrysanthemums.

Messrs. Wells, Merstham, staged Chrysanthemums.

Mr. Perkins, Greenlands, Henley-on-Thames, brought Chrysanthemums.

Mr. W. J. Godfrey, Exmouth, sent Chrysanthemums.

A. T. Miller, Esq., Emlyn House, Leatherhead, sent Chrysanthemums.

Messrs. W. Bull, Chelsea, staged miscellaneous plants.

Mr. E. Dean, Woodvale, South Norwood, staged *Primula Forbesii*.

Messrs. Peed, West Norwood, brought Begonias.

Mr. E. Potten, Cranbrook, sent Conifers.

Mr. L. R. Russell, Richmond, brought Aucubas.

Sir Henry Samuelson, Bart., Braywick Grove, Maidenhead, sent Cyclamen.

Mr. C. Engelmann, Saffron Walden, staged Carnations.

Messrs. Low, Bush Hill Park, sent Carnations, Ericas, &c.

FLORAL COMMITTEE, NOVEMBER 7, 1905.

Mr. H. B. MAY in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Mr. Norman Davis, Framfield, for Chrysanthemums.

Silver-gilt Banksian Medal.

To Mr. H. B. May, Edmonton, for Ferns, &c.

To Mrs. Bischoffsheim, Warren House, Stanmore (gr. Mr. Ellis), for Chrysanthemums.

Silver Banksian Medal.

To Messrs. J. Veitch, Chelsea, for Begonias.

To Messrs. Ware, Feltham, for alpine plants and Carnations.

To Messrs. Cannell, Swanley, for Chrysanthemums.

To Messrs. Peed, West Norwood, for Chrysanthemums.

Bronze Flora Medal.

To P. Purnell, Esq., Woodlands, Streatham Hill, for miscellaneous plants.

To the Duke of Fife, East Sheen Lodge, S.W. (gr. Mr. Mountford), for Begonias and Primulas.

Award of Merit.

To Chrysanthemum 'Reine des Roses' (votes, unanimous), from G. Ferguson, Esq., The Hollies, Weybridge (gr. Mr. Smith). A single variety producing large clusters of beautiful rosy-lilac flowers of perfect shape.

To Chrysanthemum 'Mary Richardson' (votes, unanimous), from Messrs. Wells, Earlswood. A rather large single variety, of good form, and a distinct deep terra-cotta colour.

To Chrysanthemum 'Miss Irene Cragg' (votes, unanimous), from Messrs. Cragg, Harrison, & Cragg, Heston. A single white variety of the greatest beauty: in fact, one of the most beautiful varieties we have seen.

Other Exhibits.

J. T. Bennett-Poë, Esq., Holmwood, Cheshunt, sent Nerines.

T. L. Fearon, Esq., Waverley, Folkestone, sent Chrysanthemums.

Mr. W. Seward, Hanwell, sent Chrysanthemums.

Mr. W. J. Godfrey, Exmouth, staged Chrysanthemums.

Mr. L. R. Russell, Richmond, brought hardy shrubs.

Mr. S. Mortimer, Farnham, staged Carnations.

Mr. J. C. Beck, Henley-on-Thames, brought Pelargoniums.

FLORAL COMMITTEE, NOVEMBER 21, 1905.

Mr. H. B. MAY in the Chair, and twenty members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To Mr. Philip Ladds, Swanley, for Chrysanthemums.

Silver Flora Medal.

To Messrs. J. Veitch, Chelsea, for Begonias.

To Lord Aldenham, Elstree (gr. Mr. Beckett), for Chrysanthemums.

To Mr. H. B. May, Edmonton, for miscellaneous plants.

To Messrs. Cannell, Swanley, for Pelargoniums, &c.

Silver Banksian Medal.

To Mr. A. F. Dutton, Iver, for Carnations.

To Mr. S. Mortimer, Farnham, for Carnations and Stocks.

To Mr. H. J. Jones, Lewisham, for Chrysanthemums.
To Messrs. Wells, Redhill, for Chrysanthemums.
To Messrs. Low, Bush Hill Park, for miscellaneous plants.
To Messrs. Cragg, Harrison, & Cragg, Heston, for Chrysanthemums.

Award of Merit.

To Carnation 'Christmas Eve' (votes, 9 for), from Mr. A. F. Dutton, Iver. A tree variety of American origin, with deep red flowers of good size, with fimbriated petals, non-splitting calyx, and nice perfume.

Other Exhibits.

Messrs. Ware, Feltham, staged alpine plants and Carnations.
Messrs. Peed, Streatham, brought rock plants.
Messrs. Bull, Chelsea, sent foliage plants.
Mr. L. R. Russell, Richmond, brought hardy shrubs.
Mr. G. Reuthe, Keston, staged bulbous plants.
Mr. W. H. Cheeld, Little Clacton, sent Chrysanthemum 'Miss H. C. Philbrick.'
Mr. R. Pocock, Southover Grange, Lewes, sent Chrysanthemum 'Southover Pride.'
G. Ferguson, Esq., The Hollies, Weybridge, staged Chrysanthemums.
Mr. F. Attrill, Bardolph, Ventnor, sent Chrysanthemum 'Miss Sissie Gale.'
Mr. C. Ford, Cransley Hall Gardens, Kettering, sent a seedling Chrysanthemum.
Mr. G. Carpenter, Byfleet, staged Chrysanthemums.
Mr. W. Seward, Hanwell, brought Chrysanthemums.

FLORAL COMMITTEE, DECEMBER 5, 1905.

Mr. W. MARSHALL in the Chair, and twenty-two members present.

Awards Recommended :—

Gold Medal.

To Leopold de Rothschild, Esq., Ascott, Leighton Buzzard (gr. Mr. Jennings), for Tree Carnations.

Silver-gilt Flora Medal.

To E. Brown, Esq., Highwood, Roehampton (gr. Mr. Bradford), for winter-flowering Begonias.

Silver Flora Medal.

To Messrs. Cutbush, Highbate, for Carnations.
To Messrs. J. Veitch, Chelsea, for Begonias, &c.

Silver Banksian Medal.

To Mr. H. B. May, Edmonton, for flowering plants.
To Mr. S. Mortimer, Farnham, for Carnations.
To Messrs. Ware, Feltham, for alpine plants.

Bronze Flora Medal.

To Messrs. Wells, Merstham, for Chrysanthemums.

To Messrs. Peed, Streatham, for alpine plants.

Award of Merit.

To Chrysanthemum 'Triomphe de Montbrun' (votes, 10 for, 3 against), from Messrs. Wells, Merstham. An incurved variety of moderate size, good form, and a pale bronze colour with a lighter centre.

Other Exhibits.

G. Ferguson, Esq., Weybridge (gr. Mr. Smith), sent Begonias.

Lady Wantage, Lockinge Park, Wantage (gr. Mr. Fyfe), sent Chrysanthemums.

FLORAL COMMITTEE, DECEMBER 19, 1905.

Mr. W. MARSHALL in the Chair, and nineteen members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To Messrs. Cutbush, Highgate, N., for miscellaneous plants and Carnations.

To W. S. Laycock, Esq., Oakbrook, Sheffield (gr. Mr. Massey), for foliage plants and Begonias.

Silver Flora Medal.

To Messrs. Cannell, Swanley, for Begonias.

To Messrs. Rochford, Broxbourne, for Begonias.

Silver Banksian Medal.

To Messrs. J. Veitch, Chelsea, for winter-flowering Begonias, &c.

To Mr. H. B. May, Edmonton, for Ferns.

Bronze Flora Medal.

To Messrs. Peed, Streatham, for alpine plants.

To Messrs. Ware, Feltham, for alpine plants and Carnations.

To Mr. S. Mortimer, Farnham, for Carnations.

To Mr. Waters, Balcombe, Sussex, for Carnations.

Bronze Banksian Medal.

To Miss Hopkins, Knutsford, for alpine plants and Helleborus.

Award of Merit.

To Carnation 'Aurora' (votes, unanimous), from Mr. H. Burnett, Forest Road, Guernsey. A magnificent winter-flowering variety. The colour is a salmon-cream, heavily marked with brilliant scarlet; the flower is of medium size, well formed, slightly scented, and no indication of the calyx splitting.

To Chrysanthemum 'Dr. Enguehard' (votes, 10 for, 3 against), from Messrs. Bath, Wisbech. A decorative variety, of medium size and good shape, and a very deep pink colour.

To *Nephrolepis exaltata superba* (votes, 9 for), from Mr. H. B. May, Edmonton. This is probably the finest of all *Nephrolepis*, having long arching fronds, with the pinnæ beautifully crested and divided at the apex. A charming decorative plant.

To *Citrus japonica* or Long-fruited Japanese Orange (votes, unanimous), from Messrs. J. Veitch, Chelsea. A very handsome decorative variety, small plants being heavily laden with yellow fruits about $1\frac{1}{2}$ inch long and 1 inch in diameter. Foliage small, and the habit of the plant erect.

To Carnation 'Fair Maid' (votes, 14 for), from Mr. S. Mortimer, Farnham. A very pretty variety, with soft pink flowers, above the average in size, and with large fimbriated petals. Calyx perfect.

Other Exhibits.

Messrs. Artindale, Sheffield, staged Begonia, 'Mrs. W. S. Laycock.'

Mr. G. Beer, Worthing, brought Chrysanthemum 'Chesswood Beauty.'

ORCHID COMMITTEE.

JANUARY 3, 1905.

Mr. H. J. VEITCH in the Chair, and seventeen members present.

Awards Recommended :—

Gold Medal.

To Captain G. L. Holford, Westonbirt (gr. Mr. Alexander), for a very fine group of *Cypripediums*, *Lælia anceps*, &c.

Lindley Medal.

To Captain G. L. Holford, for excellence of culture in the large specimens of *Cypripediums* in his group.

Silver Flora Medal.

To Messrs. Charlesworth, Bradford, for a group of *Lælio-Cattleya* × *Charlesworthii*, and other Orchids.

To Mr. J. Cypher, Cheltenham, for a fine group of *Cypripediums*.

Award of Merit.

To *Cypripedium* × *Memoria Jerninghamiae* (parentage unrecorded) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). Probably from *C.* × *Winnianum* × *Leeanum* var. Flower of thick texture and glossy surface. Dorsal sepal white, with a broad purple band and emerald-green marking at the base. Petals undulated, honey-yellow, tinged with purple-brown. Lip similar in colour.

To *Cypripedium* × *westfieldiense* (*Leeanum superbum* × *Pollettianum*) (votes, unanimous), from Francis Wellesley, Esq. Dorsal sepal white, with a green base and dense spotted lines of rose colour. Petals and lip yellowish, heavily tinged with mahogany-red.

To *Cypripedium* × *Alcibiades* (*Leeanum giganteum* × 'Mons. de Curte') (votes, unanimous), from Captain G. L. Holford (gr. Mr. Alexander). Dorsal sepal greenish-yellow at the base, white above, and spotted with dark purple. Petals and lip yellow, tinged with brown.

To *Dendrobium Phalenopsis* 'Chardwar variety' (votes, 8 for, 4 against), from G. F. Moore, Esq., Chardwar, Bourton-on-the-Water (gr. Mr. Page). A brightly coloured flower of a rich magenta-rose tint.

Botanical Certificate.

To *Dendrobium triflorum* from the Royal Botanic Gardens, Glasnevin, Dublin, Curator F. W. Moore, Esq. The plant usually named *D. cymbidioides* in gardens. Flowers, seven on a spray, cream-white, with purple and yellow markings on the lip.

To *Aerides Ortgiesianum* from the Royal Botanic Gardens, Glasnevin. Flowers in a loose raceme, greenish-white, slightly marked with rose on the lip and petals.

Cultural Commendation.

To Mr. A. Dye, gr. to the Right Hon. Lord Rothschild, Tring Park, for a fine eight-branched inflorescence of *Phalenopsis Aphrodite* with forty-six flowers.

Other Exhibits.

Messrs. Sander & Sons showed *Cypripediums*.

Messrs. Low sent a small collection of Orchids.

G. F. Moore, Esq. (gr. Mr. Page), showed *Cypripedium* × 'Amy Moore' (*Sallieri aureum* × *insigne*).

Jeremiah Colman, Esq. (gr. Mr. Bound), showed *Lælia anceps* 'Mrs. J. Colman,' and a three-branched spike of *Calanthe* × 'Wm. Murray.'

ORCHID COMMITTEE, JANUARY 24, 1905.

Mr. J. GURNEY FOWLER in the Chair, and nineteen members present.

Awards Recommended :—

Gold Medal.

To G. F. Moore, Esq., Chardwar, Bourton-on-the-Water (gr. Mr. W. H. Page), for a large group of *Cypripediums*, *Lælia anceps*, &c.

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a collection of hybrid Orchids.

To Messrs. Cypher, Cheltenham, for a group of *Cypripediums*, and white *Lælia anceps*.

To Messrs. Charlesworth, Bradford, for a group of hybrid Orchids.

Silver Banksian Medal.

To M. Chas. Vuylsteke, Loochristy, Ghent, for hybrid *Odontoglossums*.

First-class Certificate.

To *Cypripedium* × *Leeanum* var. 'J. Gurney Fowler' (*insigne* × *Spicerianum*) (votes, unanimous), from Messrs. Sander. A noble flower of fine substance, the large white dorsal sepal, which has a green base and purple median line, broader than high.

To *Calanthe* × *Chapmanii* (*triumphans* × 'Oakwood Ruby') (votes, 15 for, 2 against), from Norman C. Cookson, Esq. (gr. Mr. Chapman). Flowers bright ruby-crimson.

Award of Merit.

To *Cypripedium* × *San-Actæus* (*insigne* *Sanderæ* × *Actæus*) (votes, 15 for, 3 against), from Norman C. Cookson, Esq. A pale flower with greenish petals and lip, and white dorsal sepal.

To *Odontoglossum* × *mirificum* (*luteo-purpureum* *sceptrum* × *crispum*) (votes, unanimous), from Norman C. Cookson, Esq. A garden-raised hybrid of the *O.* × *Wilckeanum* class. Flowers cream-white, much spotted with brown.

To *Lalio-Cattleya* × *Charlesworthii magnifica* (*L. cinnabarina* × *C. Dowiana aurea*) (votes, unanimous), from Francis Wellesley, Esq., Westfield (gr. Mr. Hopkins). Flowers reddish-orange, with claret-red lip veined with gold.

To *Cypripedium* × 'G. F. Moore' ('Mrs. Wm. Mostyn, Chardwar variety' × *Sallieri aureum*) (votes, unanimous), from G. F. Moore, Esq. (gr. Mr. Page). Shape of *C. × Sallieri*, but with a cream-white dorsal sepal bearing some purple spots.

To *Cattleya* × 'Octave Doin' (*Mendelii* × *Dowiana aurea*) (votes, unanimous), from Messrs. Charlesworth. Sepals and petals blush white, lip purplish-crimson, with yellow veining from the base.

To *Cypripedium* × *Lawrebel* 'The Shrubbery variety' (*Lawrenceanum* × *bellatulum*) (votes, 11 for, 8 against), from F. M. Ogilvie, Esq. A very dark variety with claret-coloured flower, the dark colour changing to rose towards the white margin of the dorsal sepal.

Cultural Commendation.

To Mr. Alexander, Orchid grower to Captain G. L. Holford, C.I.E., for a fine plant of *Odontoglossum* × *Adrianæ* 'Countess of Morley,' with many spikes.

Other Exhibits.

The Right Hon. Lord Rothschild, Tring Park (gr. Mr. A. Dye), showed a life-size photograph of a large specimen of *Phalænopsis Schilleriana* grown in his gardens since 1881. Leaves 15½ inches by 5½ inches. Spike with seven main branches and eleven secondary branches, bearing eighty-eight flowers, 8-4 inches across, and eleven buds.

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed *Cypripedium* × 'Mrs. Francis Wellesley' (*Sanderianum* × *Gowerianum*), and other hybrids.

J. Gurney Fowler, Esq. (gr. Mr. Davis), sent *Cypripedium* × 'Mrs. Wm. Mostyn, Chardwar variety,' and *C. ×* 'Mrs. E. V. Low.'

Messrs. Jas. Veitch showed hybrid Orchids.

Messrs. Hugh Low staged hybrid *Cypripediums*.

Messrs. Duchesne Lanthoine & Co., Watermael, Belgium, showed *Cypripedium insigne* 'Gloire d'Auderghem.'

De B. Crawshay, Esq., sent *Maxillaria Lindeniz*.

ORCHID COMMITTEE, FEBRUARY 14, 1905.

Mr. J. GURNEY FOWLER in the Chair, and twenty-three members present.

Awards Recommended :—

Gold Medal and Lindley Medal.

To Jeremiah Colman, Esq., Gatton Park, Reigate (gr. Mr. W. P. Bound), for a very large group of finely grown *Dendrobiums* and other Orchids.

Silver-gilt Flora Medal.

To Baron Sir H. Schröder, The Dell, Egham (gr. Mr. H. Ballantine), for a fine collection of rare *Odontoglossums*, &c.

To Messrs. Charlesworth, Bradford, for a group of hybrid Orchids.

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a group of Orchids.

To N. C. Cookson, Esq., Wylam (gr. Mr. Chapman), for a collection of *Odontoglossums* and *Laelio-Cattleyas*.

Silver Banksian Medal.

To Messrs. Veitch, Chelsea, for hybrids.

First-class Certificate.

To *Cymbidium insigne* var. *Sanderi* (votes, unanimous), from Messrs. Sander, St. Albans. A noble new species from Anam. Inflorescence 2 feet high. Flowers $3\frac{1}{2}$ inches across, white, delicately tinged with pink, and with a fine veining of rose-purple over the greater part of the surface of the lip.

Award of Merit.

To *Cypripedium* $\times$ *Leonia Cravenia* (*callosum* $\times$ *insigne* 'Harefield Hall') (votes, 15 for, 4 against), from J. F. Craven, Esq., Beeches, Keighley, Yorks (gr. Mr. Corney). Resembling *C. insigne* 'Harefield Hall,' but with larger dorsal sepal, with the upper third white.

To *Cypripedium Honoriae* (*Drurii* $\times$ *Godefroya leucochilum*) (votes, unanimous), from W. M. Appleton, Esq., Weston-super-Mare (gr. Mr. Brooks). Flowers ivory-white, with some small purple spotting and an indistinct purple line up the middle of the petals and dorsal sepal.

Botanical Certificate.

To *Vanda Watsoni* from Sir Trevor Lawrence, Bart., and Messrs. Sander. Growth of *V. Kimballiana*. Flowers white.

To *Odontoglossum liliiflorum*, from Baron Schröder. Habit of *O. ramosissimum*. Flowers pink, with a few purple spots.

To *Dendrobium cymbidioides*, from F. W. Moore, Esq., Botanic Gardens, Dublin. Flowers in sprays of six or seven. Sepals and petals Indian yellow. Lip white, marked with purple.

To *Dendrobium æmulum*, from Sir Trevor Lawrence, Bart. A dwarf Australian species, with numerous racemes of elegant white flowers.

Cultural Commendation.

To Mr. W. H. White, orchid-grower to Sir Trevor Lawrence, Bart., for a pan of *Sophronitis grandiflora* with sixty flowers.

To Mr. Stables, gr. to De B. Crawshay, Esq., for *Odontoglossum triumphans leopardinum* with a large branched spike of thirty-five flowers.

Other Exhibits.

Captain G. L. Holford, C.I.E. (gr. Mr. Alexander), showed *Sophronitis rosea*.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent *Cattleya chocoensis* 'Westfield variety' and other Orchids.

Mr. J. Cypher, Cheltenham, staged a group.

Messrs. Hugh Low showed a small collection.

De B. Crawshay, Esq., showed finely grown *Odontoglossums*.

C. J. Lucas, Esq., showed *Cypripediums*.

H. T. Pitt, Esq., sent *Lælia anceps Schröderiana* and *Cypripedium Bozallii* 'Rosslyn variety.'

ORCHID COMMITTEE, FEBRUARY 28, 1905.

Mr. J. GURNEY FOWLER in the Chair, and twenty-five members present.

Awards Recommended :—

Silver Flora Medal.

To Mr. H. J. Chapman, gr. to N. C. Cookson, Esq., Wylam, for a collection of thirty-six natural-size photographs of *Odontoglossums*, &c.

Silver Banksian Medal.

To Mr. J. Cypher, Cheltenham, for a group of *Dendrobiums*.

To Messrs. Jas. Veitch, Chelsea, for hybrid Orchids.

First-class Certificate.

To *Lycaste Skinneri alba* var. *magnifica* (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), and Messrs. Hugh Low. A much larger flower than the original, with all the segments broad and of a clear white.

Award of Merit.

To *Lælia* × *Iona nigrescens* (*Dayana* × *tenebrosa*) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). Sepals and petals bright rose, veined with rose-purple. Lip claret-crimson, striped with maroon.

To *Odontoglossum* × *loochristyense* *Tracyanum* (*crispum* × *triumphans*) (votes, unanimous), from Mr. H. A. Tracy, Twickenham. Flowers large and broad. Bases of the petals and lip white, other parts yellow, with numerous chestnut-red blotches, the lip having a large blotch in front of the crest and some smaller spots at the sides.

Cultural Commendation.

To Mr. H. Alexander, orchid-grower to Captain G. L. Holford, C.I.E., Westonbirt, for a fine specimen of *Ada aurantiaca* with forty spikes.

Other Exhibits.

Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), showed *Dendrobium heterocarpum album* and *D. × Wiganie nobilius*.

Captain G. L. Holford sent the fine *Cattleya Trianaei* 'Westonbirt variety.'

The Right Hon. Lord Rothschild (gr. Mr. A. Dye) sent *Lælio-Cattleya* × *luminosa* and *Brasso-Cattleya* × *Digbyano-Mossia*.

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed *Cypripedium* × *Colossus* 'Westfield variety' and *C.* × *allertonense*.

Baron Sir H. Schröder (gr. Mr. Ballantine) showed *Odontoglossum crispum Veitchianum* and *O.* × *Wattianum* 'Hardy's variety.'

Sir R. D. Moncreiffe, Bridge of Earn, sent a good white *Odontoglossum crispum*.

Messrs. Geo. Paul, Cheshunt, showed imported forms of *Cælogyne cristata*.

Messrs. Sander & Sons staged a small group.

N. C. Cookson, Esq. (gr. Mr. Chapman), showed *Dendrobium* × *orphanum* with yellow flowers and 'Phaius' × 'Clive.'

J. S. Moss, Esq., Wintershill Hall (gr. Mr. Kench), showed a purple-spotted *Odontoglossum Pescatorei*.

Messrs. McBean, Cooksbridge, showed *Cypripedium* × 'Grace Ruby' (*Dayanum* × *Godefroyæ leucochilum*).

R. G. Thwaites, Esq., Streatham (gr. Mr. Black), sent the yellow *Dendrobium* × *chessingtonense* (*aureum* × *Wiganizæ*).

C. J. Lucas, Esq., Warnham Court (gr. Mr. Duncan), showed *Cyrtopodium punctatum* with three spikes of flowers.

ORCHID COMMITTEE, MARCH 14, 1905.

Mr. J. GURNEY FOWLER in the Chair, and fourteen members present.

Awards Recommended :—

Silver Flora Medal.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), for a group of Orchids.

To Messrs. Charlesworth, Heaton, Bradford, for a group of hybrids, *Odontoglossums*, &c.

To Messrs. Cypher, Cheltenham, for a group of *Dendrobiums*, &c.

Silver Bankman Medal.

To Messrs. Sander, St. Albans, for a group of Orchids.

Award of Merit.

To *Cypripedium* × 'Chas. Rickman' var. *magnifica* (*barbatum nigrum* × *bellatulum*) (votes, 7 for, 3 against), from Captain G. L. Holford, C.L.E., Westonbirt (gr. Mr. Alexander). Flowers purplish-rose, veined dark purple. Lip claret colour.

To *Lycaste Skinneri atro-sanguinea* (votes, 11 for, 2 against) from Captain G. L. Holford. Sepals white, tinged with rose, petals bright magenta-rose, lip dark blood-red.

To *Dendrobium Wardianum candidum* (votes, unanimous), from J. Newton Mappin, Esq., Headley Park, Epsom (gr. Mr. Beeson). Flowers large, white, with orange disc and chocolate blotch to the lip. (Fig. 45.)

To *Cypripedium* × *Haywoodianum* (× 'T. B. Haywood' × *bellatulum*) (votes, unanimous), from Mrs. Haywood, Woodhatch, Reigate (gr. Mr.

Salter). A finely shaped flower, rose-purple, veined claret colour, tip of the dorsal sepal and petals white.

To *Odontoglossum* $\times$ *amabile* (*crispum* $\times$ *Harryano-crispum*) (votes, unanimous), from M. Chas. Vuylsteke, Ghent. Flower cream-white, with slight rose tint and purple spotting.

To *Odontoglossum* $\times$ *Lawrenceanum* (*triumphans* $\times$ *Rolfeæ*) (votes, unanimous), from M. Chas. Vuylsteke. Sepals and petals yellow, heavily barred with chestnut-brown; lip white, marked with purple.

To *Brasso-Cattleya Digbyano-Trianæi* 'Heaton variety' (*Brassavola-Digbyana* $\times$ *Cattleya Trianæi*) (votes, unanimous), from Messrs. Charlesworth. Flowers lilac-rose, with greenish-yellow disc to the fringed lip.

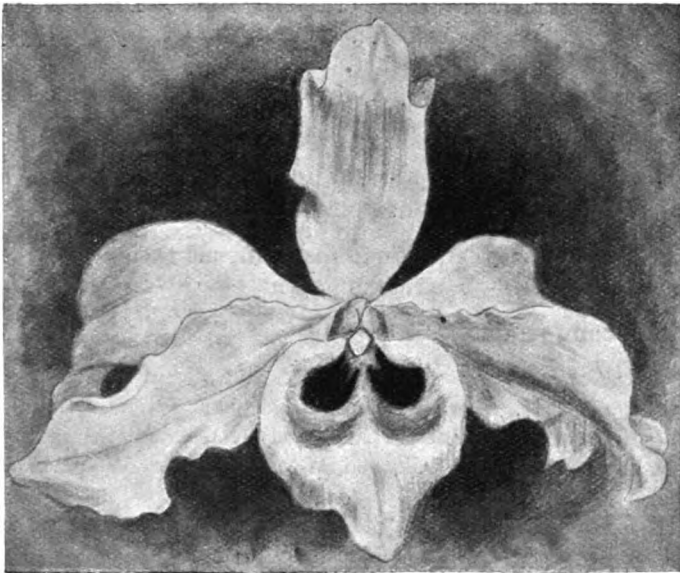


FIG. 45.—*DENDROBIUM WARDIANUM CANDIDUM*. (*Journal of Horticulture*.)

To *Dendrobium* $\times$ *chessingtonense* (*aureum* $\times$ *Wiganiaë*) (votes, 12 for, 2 against), from R. G. Thwaites, Esq., Chessington, Streatham (gr. Mr. Black). Flowers large, bright yellow, with chocolate disc to the lip.

To *Dendrobium* $\times$ *Elwesii* (*Hildebrandii* $\times$ *aureum*) (votes unanimous), from H. J. Elwes, Esq., Colesborne, Cheltenham. Flowers cream-white, with a purple blotch at the base of the lip.

Cultural Commendation.

To M. Chas. Vuylsteke for a fine example of *Odontoglossum* $\times$ *ardentissimum*.

Other Exhibits.

The Right Hon. the Earl of Tankerville showed a small collection of rare Orchids.

Francis Wellesley, Esq., sent *Cypripedium* $\times$ *allertonense* *magnificum*.

Sir Trevor Lawrence, Bart., showed cut spikes of *Odontoglossum coronarium miniatum* and *Epi-Cattleya Gaskello-Parkinsoni*.

B. G. Thwaites, Esq., showed a number of *Dendrobium* × *Blackianum* (*Wigania* × *Findlayanum*) exhibiting great variation.

F. Menteith Ogilvie, Esq., Oxford (gr. Mr. Balmforth), sent *Cypripedium callosum Sanderæ*, 'Shrubby variety.'

Alderman William Bolton, Mayor of Warrington (gr. Mr. Cain), sent *Cypripedium Chamberlainianum magnificum*.

M. Jules Hye, Ghent, showed *Cattleya* × 'Madame Jules Hye' (*Gaskelliana alba* × *Mossia Wageri*).

Messrs. Hugh Low showed *Oncidium Lowii*, said to be a natural hybrid of *O. Cavendishianum*.

Mr. J. Douglas showed varieties of *Cypripedium* × *Deedmanianum*.

The Rev. F. Mason, Warwick, sent *Brasso-Cattleya* × *Digbyano-Warneri*.

A. Houlder, Esq., Bexley (gr. Mr. Dyer), sent a fine specimen of *Cælogyne cristata* 'Trentham variety.'

ORCHID COMMITTEE, MARCH 28, 1905.

Mr. J. GURNEY FOWLER in the Chair, and twenty-three members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Baron Sir H. Schröder, The Dell, Egham (gr. Mr. Ballantine), for a fine group of rare *Odontoglossums* and *Dendrobiums*.

To N. C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Chapman), for a collection of *Odontoglossums*.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a group of Orchids, principally not hybrids.

Silver Banksian Medal.

To Messrs. Sander & Sons, St. Albans, for a group of Orchids.

To Messrs. Charlesworth, Heaton, Bradford, for a group of Orchids.

Award of Merit.

To *Odontoglossum crispum* 'Prince Leopold' (votes 16 for, 2 against), from N. C. Cookson, Esq., Wylam (gr. Mr. Chapman). Flowers French white, with large red-brown blotches on the sepals, and clusters of smaller spots on the petals; lip and petals fringed.

To *Odontoglossum* × *ardentissimum* 'Doris' (*Pescatorei* × *crispum* var.) (votes, unanimous), from N. C. Cookson, Esq. A fine white flower, heavily blotched with purplish-crimson.

To *Odontoglossum ardentissimum* 'Sibyl' (votes, unanimous), from N. C. Cookson, Esq. A large white flower, with effective markings of rose-purple.

To *Odontoglossum* × *Adrianae aureum* (*crispum* × *Hunnewellianum*) (votes, 16 for, 1 against), from Baron Sir H. Schröder (gr. Mr. Ballantine). Flowers large, light yellow, spotted with red-brown.

To *Odontoglossum* × *ardentissimum* 'Lamus' (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. Sepals and petals white, with broad bands of dark purple.

To *Dendrobium* × *melanodiscus* *Haywoodiæ* (× *Ainsworthii splendissimum* × *Findlayanum*) (votes, unanimous), from Mrs. Haywood, Woodhatch, Reigate. Flowers large, tinged with pale rose; lip orange-colour, with chocolate disc and rose apex.

To *Cælogyne Lawrenceana* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Of the section *Filifera* and allied to *C. speciosa*. Flowers large, sepals broad, pale green; petals narrow, greenish, tinged with brown; lip yellowish at the base and bearing ridges of brown papillæ; front of lip white.

To *Cælogyne speciosa alba* (votes, unanimous), from Messrs. Sander & Sons. Sepals and petals yellowish; lip white, with salmon-coloured base.

Botanical Certificate.

To *Dendrobium moniliforme* (*japonicum*) from Messrs. Wm. Cutbush & Sons, Highgate. The well-known dwarf Japanese Dendrobe with white flowers.

Other Exhibits.

F. A. Bevan, Esq. (gr. Mr. Parr), showed *Odontoglossum* × *elegans* 'Trent Park variety.'

Mr. H. A. Tracy sent *Cypripedium* × *Wormsiæ* (*Charlesworthii* × *villosum*).

Messrs. Hugh Low staged a small group of Orchids.

Mr. H. Whateley, Kenilworth, showed *Odontoglossum crispum* 'Mabel Whateley.'

ORCHID COMMITTEE, APRIL 11, 1905.

Mr. J. GURNEY FOWLER in the Chair, and twenty-four members present.

Awards Recommended:—

Silver Flora Medal.

To H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. Day), for a group of Orchids.

To Messrs. Sander & Sons, for a group of hybrid *Odontoglossums*, &c.

To Messrs. Charlesworth & Co., Bradford, for a group of Orchids.

Silver Banksian Medal.

To Messrs. Hugh Low for a collection of Orchids.

First-class Certificate.

To *Odontoglossum ramosissimum* 'Burford variety' (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers white, spotted with purple, larger than the type. The plant shown had a branched spike of eight flowers.

To *Odontoglossum* $\times$ *Wiganianum* ($\times$ *Wilckeanum* $\times$ *Rolfeæ*), from Sir Frederick Wigan, Bart., (gr. Mr. W. H. Young). Flowers formed like *O.* $\times$ *Rolfeæ*, canary-yellow, marked with purple. (Fig. 46.)

Award of Merit.

To *Odontoglossum* $\times$ *amœnum*, 'Sander's variety' (*Pescatorei* $\times$ *luteo-purpureum sceptrum*) (votes, 14 for, 1 against), from Messrs. Sander & Sons. Flowers cream-white, marked with purple-brown.

To *Zygopetalum discolor atro-cæruleum* (votes, 14 for, 1 against), from Messrs. Sander & Sons. Sepals greenish-white, slightly tinged with blue; petals white, shaded with violet; lip violet with white, toothed crest.

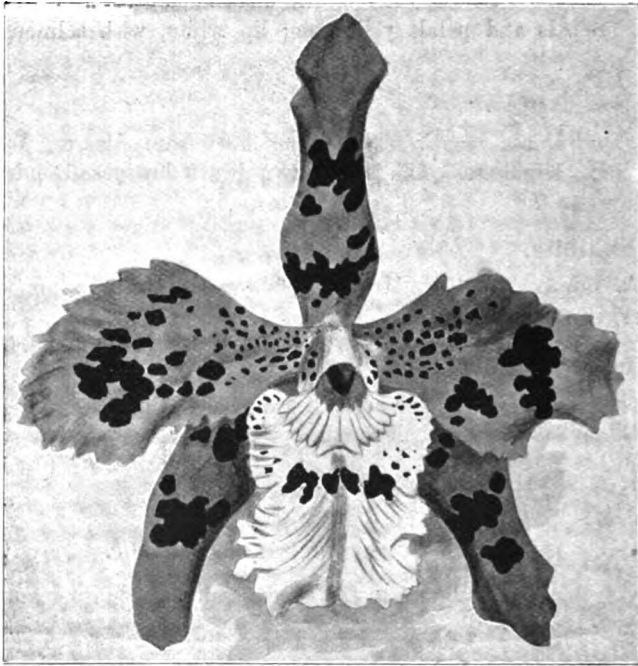


FIG. 46. — *ODONTOGLOSSUM* $\times$ *WIGANIANUM*. (*Journal of Horticulture*.)

To *Odontoglossum crispum* 'Britain's Queen' (votes, unanimous), from H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood). Sepals and petals tinged with purple at the back, tinged with lilac and evenly spotted with purple on the surface.

To *Epidendrum* $\times$ *Boundii* (*radicans* $\times$ *Burtoni* (*O'Brienianum* $\times$ *ibaguense*)) (votes, unanimous), from Jeremiah Colman, Esq. (gr. Mr. W. P. Bound). A very floriferous hybrid, with globular heads of yellow flowers, tinted with red.

To *Dendrobium fimbriatum oculatum*, 'Westonbirt variety' from Captain G. L. Holford (gr. Mr. Alexander). A large form, with flowers one-third larger than ordinary forms. Bright yellow, with chocolate-purple disc.

Other Exhibits.

Sir Trevor Lawrence, Bart., staged a very interesting selection of rare Orchids.

Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins), sent *Cattleya amethystoglossa* 'Westfield variety.'

Messrs. W. Cutbush & Sons, Highgate, showed a greenish-yellow form of the Japanese *Calanthe discolor*.

ORCHID COMMITTEE, APRIL 25, 1905.

Mr. H. J. VEITCH in the Chair, and eighteen members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Chapman), for a group of varieties of *Odontoglossum crispum*.

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

Silver Flora Medal.

To Messrs. Sander & Sons, for a group of Orchids.

Silver Banksian Medal.

To C. J. Lucas, Esq., Warnham Court (gr. Mr. Duncan), for a collection of *Odontoglossums*.

First-class Certificate.

To *Brasso-Cattleya* × *nivalis* (*Brassavola fragrans* × *Cattleya intermedia*) (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers white, with primrose disc to the lip; fragrant. (Fig. 47.)

To *Cattleya Schrödera alba* var. 'Madame Louis de Hempinne' (votes, unanimous), from the Marquis de Wavrin, Somerghem, Belgium (gr. Mr. de Geest). A fine pure white, with yellow throat to the lip.

To *Cattleya Schrödera* 'Robin' (votes, unanimous), from J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge). Flowers white, tinted with lavender and bearing a violet-purple blotch on the lip.

To *Odontoglossum* × *Thompsonianum* (*Edwardii* × *crispum*) (votes, unanimous), from W. Thompson, Esq., Stone, Stafford (gr. Mr. W. Stevens). Plant bearing a tall branched spike as in *A. Edwardii*. Flower 2½ inches across, shaped like *O. crispum*. Colour rich claret-purple, with rose tips and margins to the segments.

Award of Merit.

To *Odontoglossum crispum Smeeanum* (votes, unanimous), from Norman C. Cookson, Esq. Flowers large, rose-pink, with uniform light brown spots.

Botanical Certificate.

To *Oncidium O'Brienianum*, from Miss E. Willmott, Warley Place (gr. Mr. Preece). Flowers in dense branched spikes, brown, with red-brown lips.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed *Cypripedium Gowerianum giganteum*, and *Lælia* × 'Mrs. Gratrix,' 'Westfield variety.'

Baron Sir H. Schröder (gr. Mr. Ballantine) sent *Odontoglossum crispum* 'Queen's Birthday,' a handsomely blotched form.

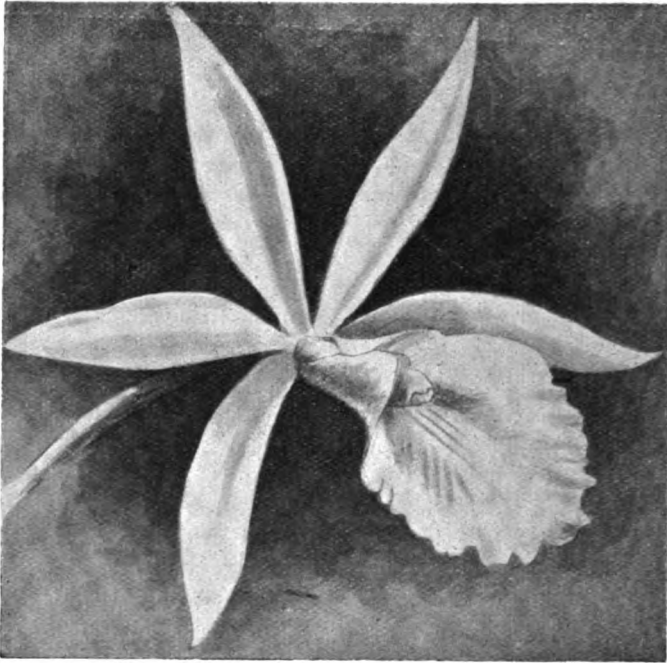


FIG. 47.—BRASSO-CATTELEYA × NIVALIS. (*Journal of Horticulture*.)

J. Bradshaw, Esq. (gr. Mr. Whitelegge), sent two hybrid Orchids.

W. C. Walker, Esq., sent *Odontoglossum coronarium*.

De B. Crawshay, Esq. (gr. Mr. Stables), showed *Odontoglossum Rossii immaculatum*.

G. F. Moore, Esq. (gr. Mr. Page), showed *Lælio-Cattleya* × *Pallas magnifica*.

Mrs. Haywood (gr. Mr. Salter) sent *Odontoglossum crispum*, 'Wood-hatch variety.'

ORCHID COMMITTEE, MAY 9, 1905.

Mr. J. GURNEY FOWLER in the Chair, and twenty-three members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To F. Menteith Ogilvie, Esq., Oxford (gr. Mr. Balmforth), for a group of Orchids.

To Messrs. J. Cypher, Cheltenham, for a group of Orchids.

Silver Flora Medal.

To Baron Sir H. Schröder (gr. Mr. Ballantine) for a group of *Odontoglossums*, &c.

To H. S. Goodson, Esq., Putney (gr. Mr. Day), for a group of *Cattleyas* and *Dendrobiums*.

To Messrs. Charlesworth, Bradford, for hybrid Orchids and *Odontoglossums*.

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. White), for a collection of rare Orchids.

Silver Banksian Medal.

To Messrs. Hugh Low, Enfield, for a group of Orchids.

To C. J. Lucas, Esq., Warnham Court (gr. Mr. Duncan), for *Odontoglossums*.

First-class Certificate.

To *Odontoglossum crispum* 'Louis L. Sander' (votes, unanimous), from J. Leemann, Esq., Heaton Mersey (gr. Mr. Edge). A very beautiful variety, with flowers heavily blotched with purplish-crimson.

To *Cymbidium rhodochilum* (votes, unanimous), from J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge). A fine Madagascar species with upright spikes of flowers. Sepals and petals green; lip magenta-rose, with dark spots at the base.

Award of Merit.

To *Brasso-Cattleya* × 'Mrs. J. Leemann' (*B. Digbyana* × *C. Dowiana aurea*) (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. White). Flowers yellow, slightly tinged with green and pale rose; lip fringed.

To *Bulbophyllum Reinwardtii* (votes, 10 for, 0 against), from Sir Trevor Lawrence, Bart. Strong growth of *B. Ericssonii*; flowers large. Sepals and petals green, faintly striped with purple. Lip hinged, fleshy, crimson-purple on the upper surface.

To *Epi-Lalia* × 'Sylvia' (*L. cinnabarina* × *E. Cooperianum*) (votes unanimous), from Sir Trevor Lawrence, Bart. Flowers in terminal racemes, white, tinged with salmon-red.

To *Lælio-Cattleya* × 'G. S. Ball' *magnifica* (*L. cinnabarina* × *C. Schrödera*) (votes, 12 for, 4 against), from Sir Trevor Lawrence, Bart. A handsome variety, with uniformly coloured bright orange flowers.

To *Odontoglossum crispum* 'Titus' (votes, unanimous), from J. Leemann, Esq., Heaton Mersey (gr. Mr. Edge). Flowers white, blotched with chocolate-purple.

To *Odontoglossum crispum aureum* 'West Bank House variety' (votes, 15 for, 8 against), from J. Leemann, Esq. A pretty canary-yellow-coloured variety.

Botanical Certificate.

To *Dendrobium crumenatum*, from Sir Trevor Lawrence, Bart. A Malayan species, with white flowers, having a yellow disc to the lip.

To *Odontoglossum Lindleyanum aureum*, from De B. Crawshay, Esq. A yellow variety, in which the brown colouring of the type is suppressed.

Other Exhibits.

Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins), again showed the yellow *Cypripedium* × *Wellesleyanum*.

De B. Crawshay, Esq., showed a fine *Odontoglossum triumphans* grown in a clear glass pot.

Mr. H. Whateley, Kenilworth, showed three spotted *Odontoglossums*.

Jeremiah Colman, Esq., sent a hybrid between *Diacrium bicornutum* and *Epidendrum radicans* with red flowers.

M. Chas. Vuylsteke, Ghent, sent hybrid *Odontoglossums*.

Frau Ida Brandt, Riesbach, Zurich, sent a fine flower of the rare *Angraecum infundibulare*. (Vote of Thanks.)

ORCHID COMMITTEE, MAY 28, 1905.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Baron Sir H. Schröder (gr. Mr. Ballantine), for a group of Orchids.

To H. T. Pitt, Esq. (gr. Mr. Thurgood), for a group of Orchids.

Silver Flora Medal.

To H. S. Goodson, Esq., Putney (gr. Mr. Day), for a collection of *Odontoglossums* and other Orchids.

First-class Certificate.

To *Cypripedium* × *Dom Carlos superbum* (*Godefroya leucochilum* × *Lawrenceanum*) (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Chapman). A finely formed hybrid, with white flowers; the upper sepal bearing dotted lines of purple, and the petals an effective spotting of the same colour. (Fig. 48.)

To *Cattleya* × *Pittia* (*Harrisoniana* × *Schilleriana*) (votes, unanimous), from H. T. Pitt, Esq. Habit and form of *C. Schilleriana*.

Flowers of a uniform purplish rose colour. Lip blush-white with rose lines.

Award of Merit.

To *Dendrobium* × 'Venus' 'Cookson's variety' (*Falconeri* × *nobile*) (votes, 18 for, 8 against), from Norman C. Cookson, Esq. Flowers white, with the outer halves of the segments dark rose. Disc of lip maroon, with orange-coloured band.

To *Odontoglossum* × *Lucasianum heatonense* (? *Halkii* × *cristatellum*) (votes, 8 for, 1 against), from Baron Schröder (gr. Mr. Ballantine).

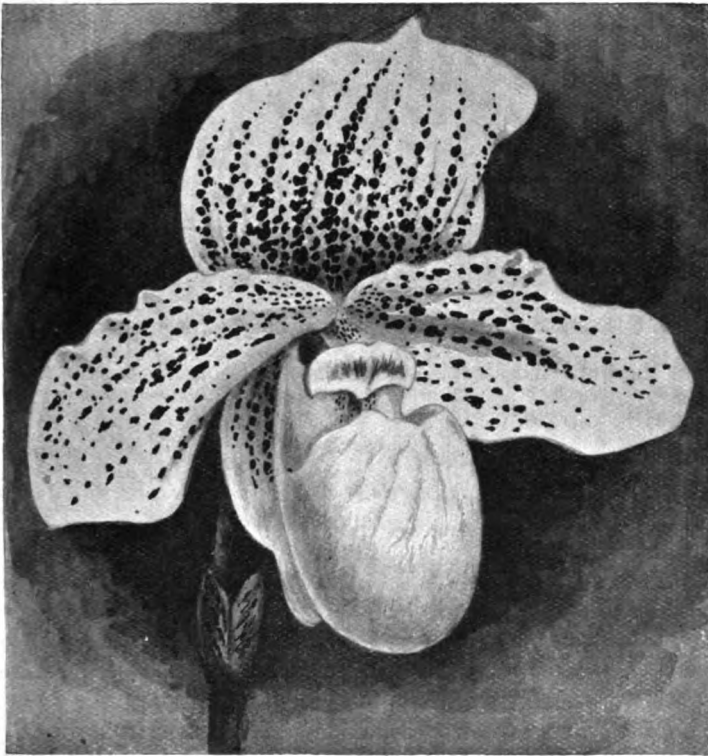


FIG. 48.—*CYPRIPEDIUM* × 'DOM CARLOS' SUPERBUM. (*Journal of Horticulture*.)

Sepals and petals purplish-chocolate, tipped and edged with yellow. Lip cream-white, spotted with brown around the crest.

To *Zygopetalum* × *Crawshayanum* (*xanthinum* × *stapeloides*) (votes, unanimous), from De B. Crawshay, Esq. (gr. Mr. Stables). Flowers 2½ inches across, yellow, with a greenish tint, and profuse spotting of purplish red.

Botanical Certificate.

To *Polystachya Haroldiana* from Norman C. Cookson, Esq. Sent from the neighbourhood of Lake Tanganyika, by Mr. Harold Cookson.

Habit dwarf. Flowers five on a short spike, white, tinged with green on the sepals.

Cultural Commendation.

To Mr. May (gr. to J. B. Joel, Esq., Potter's Bar), for a very large specimen of *Cypripedium Rothschildianum* with three spikes, each of five flowers and one bud.

Other Exhibits.

The Right Hon. Lord Rothschild (gr. Mr. Dye) sent the finely coloured *Lælia purpurata*, 'Tring Park variety.'

The Right Hon. Lord Auckland (gr. Mr. Matthews) showed cut spikes of *Lissochilus Krebsii*.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent *Lælia purpurata* 'Mrs. R. A. H. Mitchell,' *Cattleya Skinneri* 'Minnie,' *Cypripedium Lawrenceanum* 'Majestas,' and *Lælio-Cattleya* × *Lucia* 'Westfield variety.'

Messrs. Hugh Low staged a small group.

Messrs. John Cowan showed *Odontoglossum crispum* 'Edith Bolton.'

John S. Moss, Esq., sent a good spotted *Odontoglossum crispum*.

ORCHID COMMITTEE, TEMPLE SHOW, MAY 30, 1905.

Mr. N. C. COOKSON in the Chair, and twenty-seven members present.

[For the Cups and Medals awarded by the Council, see page xxiii].

Awards Recommended :—

First-class Certificate.

To *Cattleya citrina maxima* (votes, unanimous), from the Marquis de Wavrin, Somerghem, Belgium (gr. M. de Geest). Flowers very large, rich yellow, fragrant.

To *Zygopetalum Ballii* (votes, unanimous), from Elijah Ashworth, Esq., Harefield Hall (gr. Mr. Holbrook). Probably a natural hybrid of *Zygopetalum rostratum*, and resembling the garden hybrid *Z.* × *Roeblingianum*. Flowers white, with purple markings up each of the segments, and at the base of the lip. (Fig. 49.)

To *Odontoglossum* × *amabile* 'Ixion' (*Harryano-crispum* × *crispum*) (votes, unanimous), from M. Chas. Vuylsteke, Loochristy, Ghent. A fine blush-white flower, with reddish-rose markings on the sepals and petals. (Fig. 50.)

Award of Merit.

To *Odontoglossum* × *Lawrenceanum* 'Adonis' (*triumphans* × *Rolfæ*) (votes, unanimous), from M. Chas. Vuylsteke. A fine yellow flower, heavily barred with chocolate-purple. Lip white, with purple marks around the crest.

To *Odontoglossum* × *loochristyense* 'Arddarroch variety' (*crispum* × *triumphans*) (votes, unanimous), from R. Brooman-White, Esq., Garelochhead, N.B. Flowers large, the basal ground-colour of the segments whitish, the apical halves yellow, both colours blotched with chestnut brown.

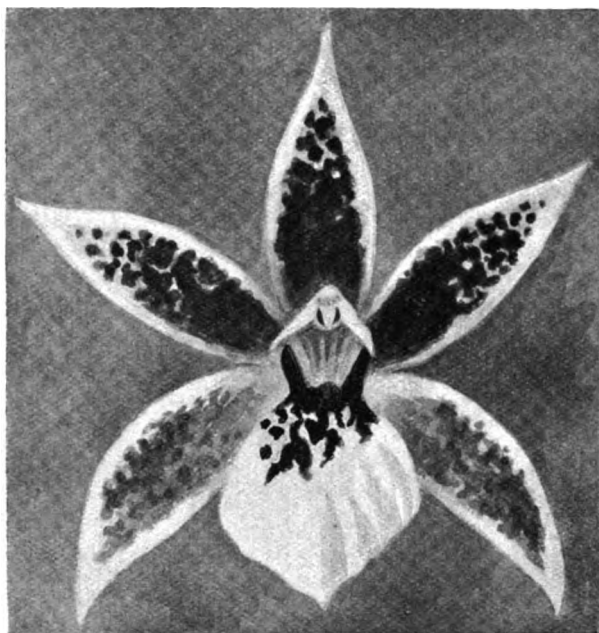


FIG. 49. — ZYGOPETALUM BALLII (*Journal of Horticulture.*)

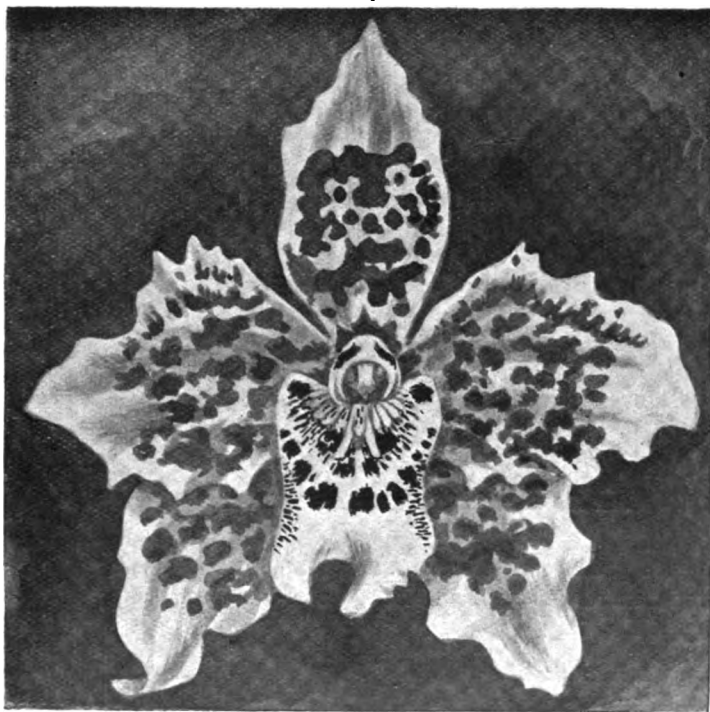


FIG. 50.—ODONTOGLOSSUM × AMABILE 'IXION.' (*Journal of Horticulture.*)

To *Cattleya Mendelii* 'Cicero' (votes, 18 for, 0 against), from Messrs. Hugh Low & Co. A large and finely shaped flower; blush-white, with rosy-crimson front to the lip.

To *Cattleya Schilleriana* 'Westfield variety' (votes, 18 for, 5 against), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins).

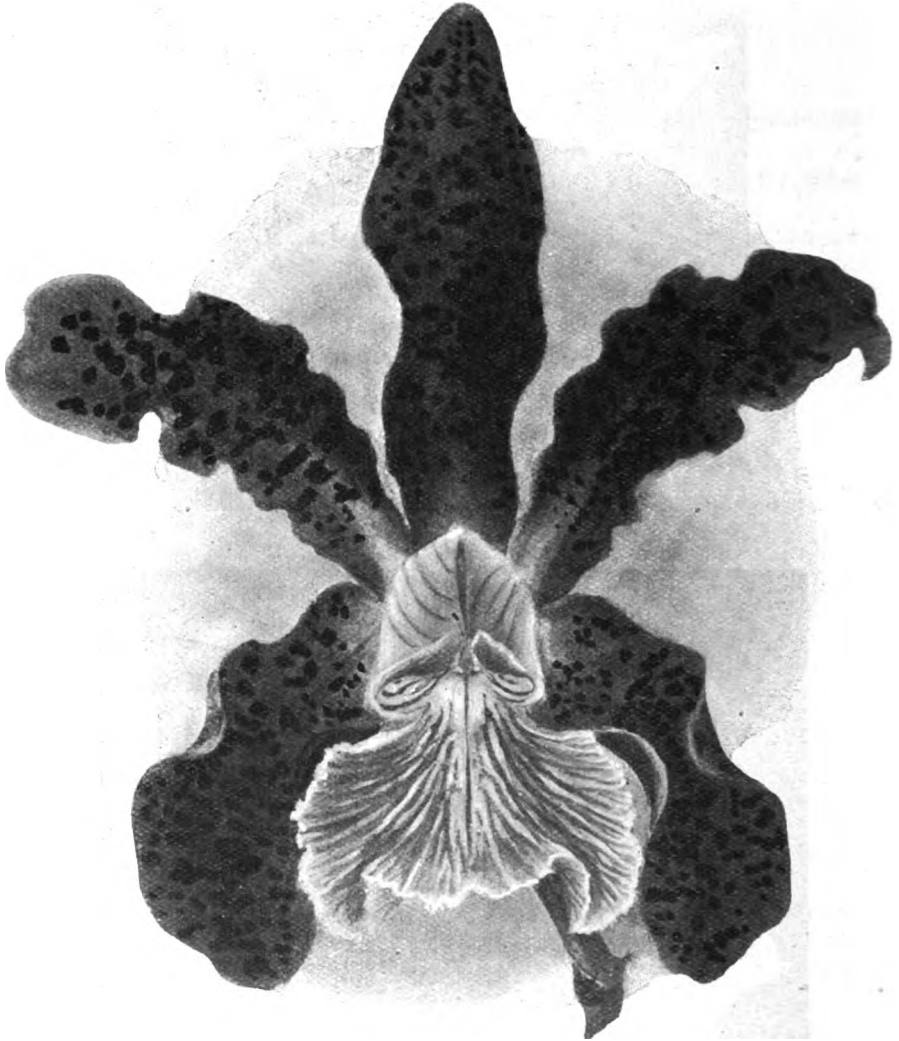


FIG. 51.—*CATTELEYA SCHILLERIANA* 'WESTFIELD VARIETY.'

Sepals and petals dark olive-brown, with chocolate-purple spots. Lip magenta-crimson, with the white ground-colour showing between the veining. (Fig. 51.)

Botanical Certificate.

To *Bletia hyacinthina alba*, from Messrs. W. Cutbush & Sons. A pure white form of that originally named *B. Gebina*. Native of Japan.

Cultural Commendation.

To Mr. W. P. Bound, gr. to Jeremiah Colman, Esq., Gatton Park, for a large specimen of *Odontoglossum crispum* with four flower-spikes, which had been grown in two years, from a single bulb, taken from an established plant.

Other Exhibits.

Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), staged a magnificent group of Orchids, in the formation of which 18 genera, 89 species, 9 varieties, and 18 hybrids were displayed.

Jeremiah Colman, Esq. (gr. Mr. Bound), exhibited an excellently arranged group.

Messrs. Sander & Sons had a magnificent group occupying 200 square feet.

Messrs. Charlesworth & Co. staged an effective group of rare Orchids extending over 200 square feet.

John Rutherford, Esq. (gr. Mr. Lupton), staged a group of Orchids.

Messrs. Wm. Bull had an effective arrangement of *Lælias*, *Cattleyas*, &c.

Mr. John Robson, Altrincham, staged a group of *Odontoglossums* and other Orchids.

Messrs. Stanley & Co., Southgate, showed a selection of good *Cattleya Mossiae*, &c.

Messrs. Hugh Low had a good group of Orchids.

J. Forster Alcock, Esq., showed *Odontoglossums*.

E. Roberts, Esq., Eltham, sent good varieties of *Cypripedium bellatulum*.

ORCHID COMMITTEE, JUNE 20, 1905.

Mr. J. GURNEY FOWLER in the Chair, and seventeen members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White), for a group of Orchids containing many rare species and varieties.

To Messrs. Charlesworth & Co., for a group of hybrid Orchids.

To Messrs. Sander & Sons, for a fine selection of Orchids.

Silver Flora Medal.

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a fine group of Orchids.

To Messrs. Hugh Low, for a group of *Cattleyas*, &c.

To Messrs. Stanley, for *Cattleyas*, &c.

Silver Banksian Medal.

To Mrs. Ernest Hills, Redleaf, Penshurst (gr. Mr. Ringham), for a group of *Miltonia vexillaria*.

First-class Certificate.

To *Sophro-Lælia* × *leta Orpetiana* (*L. Dayana* × *S. grandiflora*) (votes, unanimous), from Major G. L. Holford, C.I.E. (gr. Mr. Alexander). Flowers bright magenta-crimson, with yellow base to the lip. **A.M.**, March 25, 1902. (Fig. 52.)

To *Lælio-Cattleya* × 'King of Spain' (parentage unrecorded) (votes, 10 for, 8 against), from Messrs. Jas. Veitch & Sons. A large and finely formed flower, with strong indication of *Cattleya Warnerii*. Sepals and petals bright rosy-lilac; front of lip bright crimson-purple; disc yellow, with purple markings at the base.

Award of Merit.

To *Odontonia* × *Lairessæ* (*Miltonia Warscewiczii* × *Odontoglossum crispum*) (votes, unanimous), from M. A. de Lairesse, Liège, Belgium.

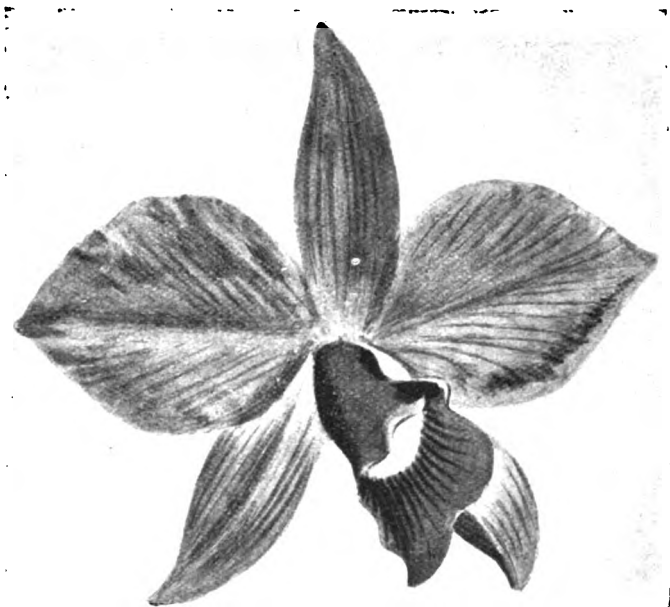


FIG. 52.—*SOPHRO-LÆLIA* × *LETA ORPETIANA*. (*Journal of Horticulture*.)

Habit and general form of the flower approaching *M. Warscewiczii*, but the flowers broader in all the parts; white, with the inner two-thirds of the segments blotched with rose.

To *Epidendrum* × *radico-vitellinum* (*E. radicans* × *E. vitellinum*) (votes, unanimous), from Sir Trevor Lawrence, Bart. Habit of *E. radicans*, the terminal inflorescence bearing many orange-coloured flowers similar to those of *E. vitellinum*.

To *Epi-Lælia* × *vitell-brosa* (*E. vitellinum* × *L. tenebrosa*) (votes, unanimous), from Sir Trevor Lawrence, Bart. Inflorescence erect; flowers 2½ inches across. Sepals and petals bronzy yellow; lip yellowish, with rose markings.

Botanical Certificate.

To *Brassavola Perrinii*, from Sir Trevor Lawrence, Bart. Leaves terete, flowers with narrow greenish sepals and petals and white lip.

To *Bulbophyllum radiatum* from Sir Trevor Lawrence, Bart. A small tufted plant with umbels of slender white flowers.

To *Epidendrum pterocarpum* from Sir Trevor Lawrence, Bart. Sepals and petals greenish brown; lip white, with purple lines on the extended side lobes.

Cultural Commendation.

To Mr. W. H. White, orchid-grower to Sir Trevor Lawrence, Bart., for *Brassavola Perrinii* with many fragrant flowers.

To Mr. Luckhurst, gr. to Sir John Edwards-Moss, Henley-on-Thames, for a finely flowered specimen of *Lycaste Deppei*.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent *Cypripedium Sanderae* allied to *C. concolor*; *Cattleya Mossiae* 'Miss Ethel Harting,' and *Lahio-Cattleya* × 'Mrs. Reginald Brade' (*C. Schröderae* × *L.-C.* × *Aphrodite*).

R. Brooman-White, Esq., showed cut *Odontoglossum crispum*.

R. Briggs-Bury, Esq., Accrington (gr. Mr. Wilkinson), showed *Cypripedium Lawrenceanum Hyeaenum*, 'Bank House variety,' a strong grower with large flowers.

W. A. Bilney, Esq., Weybridge, showed *Dendrobium Dalhousieanum*, 'Fir Grange variety,' a sulphur-yellow flower, with claret blotches on the lip.

ORCHID COMMITTEE, JULY 4, 1905.

Mr. J. GURNEY FOWLER in the Chair, and sixteen members present.

Awards Recommended:—*First-class Certificate.*

To *Cymbidium Huttonii* (votes, unanimous), from Messrs. Charlesworth, Bradford. A reintroduction of the Java plant to which a Special Certificate was given May 5, 1868, the plant having then been collected by H. Hutton for Messrs. Veitch. The species connects *Cymbidium* and *Grammatophyllum*, the large grooved two- to three-leafed pseudo-bulbs much resembling *G. multiflorum*. The pendulous racemes are produced like *Cymbidium Devonianum*, ten- to fifteen-flowered. Flowers about 2 inches across, yellowish, densely spotted with purple, the petals also tinged with dark purple on the outer halves. Two forms were shown, the one darker than the other in colour.

To *Cypripedium* × 'Daisy Barclay' (*Godefroya leucochilum* × *Rothschildianum*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). A handsome dwarf, large-flowered species, with extended ivory-white petals bearing numerous claret-purple lines. Upper sepal white, with broad dotted lines of claret-purple; labellum ivory-white, with purple spotting on the face.

To *Cypripedium Lawrenceanum* Hyeaum 'Bank House variety' (votes, 18 for, 1 against), from R. Briggs-Bury, Esq., Bank House, Accrington (gr. Mr. Wilkinson). A very free-growing variety, with broader dorsal sepal than the original form. Sepals white, with emerald-green lines. Petals and lip emerald-green.

Award of Merit.

To *Cypripedium Godefroyæ citrinum* (votes, 18 for, 1 against), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). A fine

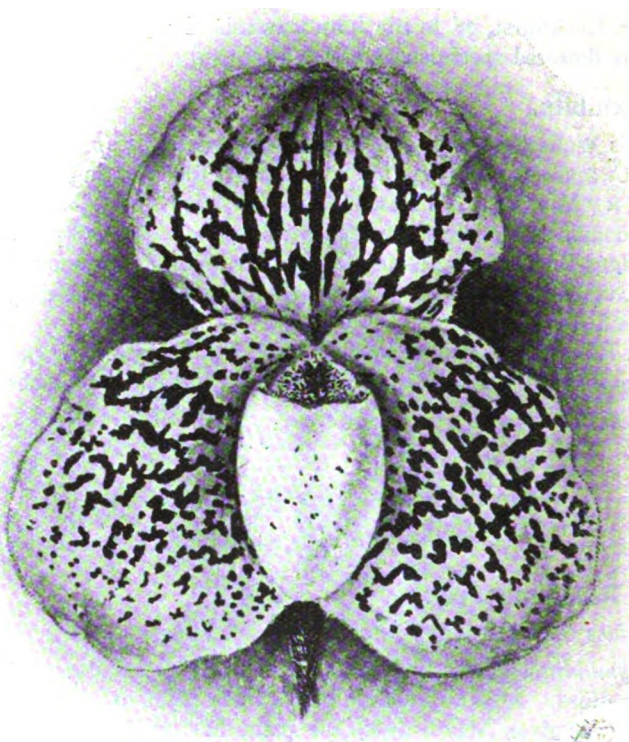


FIG. 53.—*CYPRIPEDIUM GODEFROYÆ CITRINUM*.

large pale-yellow flower, with a broad irregular network of claret colour on the upper sepal and petals. (Fig. 58.)

To *Laelio-Cattleya* × *Massangeana* 'Harry Goodson' (*L. tenebrosa* × *L.-C.* × *Schilleriana*) (votes, unanimous), from H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. Day). Sepal and petals yellowish, tinged and veined with brownish-rose; lip white at the base; side lobes and front purplish-crimson.

To *Oncidium crispum* 'Shrubbery variety,' from F. Menteith

Ogilvie, Esq., Oxford (gr. Mr. Balmforth). Flowers large, dark chocolate-brown, with a small yellow patch in front of the crest of the lip.

Cultural Commendation.

To Mr. Balmforth (gr. to F. Menteith Ogilvie, Esq.), for a small batch of finely grown *Cypripedium niveum* with thirty-six flowers.

Other Exhibits.

Francis Wellesley, Esq., sent *Laelio-Cattleya* × 'Mrs. Freke Gould' (*L. tenebrosa* × *C. × intertexta*).

De B. Crawshay, Esq. (gr. Mr. Stables), showed two forms of *Odontoglossum* × *crispodinei* (*crispum* × *Coradinei*). Flowers nearly as large as those of *O. crispum*, cream-white, with one large brown blotch on the sepals and occasionally on the petals.

R. G. Thwaites, Esq., Streatham (gr. Mr. Black), showed *Odontoglossum crispum album* 'Thwaites' variety.'

H. Little, Esq., Twickenham (gr. Mr. Howard), sent *Laelio-Cattleya* × *Ivernia* 'Little's variety' (*L.-C. × callistoglossa* × *L. tenebrosa*).

H. T. Pitt, Esq. (gr. Mr. Thurgood), showed the finely blotched *Odontoglossum crispum* 'Fearnley Sander.'

Mr. J. Bruce, Surrey Street, Strand, sent two *Epidendrum alatum*.

ORCHID COMMITTEE: CHELSEA, JULY 11, 1905.

Mr. N. C. COOKSON in the Chair, and twenty-two members present.

[For the Cups and Medals awarded by the Council, see p. xxvii].

Awards Recommended:—

First-class Certificate.

To *Cattleya Mossiae alba* 'Tracy's variety' (votes, 18 for, 8 against), from N. C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman). A fine pure white variety, resembling in the growth of the plant *C. Gaskelliana*.

To *Cattleya Mossiae Reineckiana excelsa* (votes, unanimous), from Messrs. Sander, St. Albans. Flower large, pure white, with the front of the labellum ruby-crimson with clear violet shade.

Award of Merit.

To *Cattleya Warscewiczii* 'Our Queen' (votes, 10 for, 5 against), from Messrs. Sander. Sepals and petals white; lip of ordinary *C. Warscewiczii*.

To *Bulbophyllum Lobbii colossum* (votes, unanimous), from Walter Cobb, Esq., Tunbridge Wells. A large form. Flowers over 4 inches across, light buff-yellow, with obscure purple marking; lip hinged. Odour resembling fresh-cut cucumber.

Cultural Commendation.

To Mr. Walter Cobb for *Bulbophyllum Lobbii colossum* with about forty flowers.

Other Exhibits.

Jeremiah Colman, Esq., Gatton Park (gr. Mr. W. P. Bound), staged a very fine group of Orchids, including a selection of British Orchids in flower.

Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), staged a good group of Orchids.

Messrs. Charlesworth, Bradford, had a large group, principally hybrids.

Messrs. Sander, St. Albans, staged a group in which the forms of *Lælio-Cattleya* × *Martinetti* were well displayed.

Messrs. Hugh Low, Enfield, staged a group of Cattleyas, &c., one specimen of *C. Mendelii* having twenty-one flowers.

ORCHID COMMITTEE, JULY 18, 1905.

Mr. H. J. VEITCH in the Chair, and eleven members present.

Awards Recommended :—

Award of Merit.

To *Lælio-Cattleya* × *chardwarensis* (*L. cinnabarina* × *C. dolosa*) (votes, unanimous), from G. F. Moore, Esq., Chardwar, Bourton-on-the Water (gr. Mr. Page). A compact-growing hybrid with an inflorescence about one foot high and bearing a head of eight flowers, each 8½ inches across. Flowers blush-white, tinged with rose at first and later assuming a golden sheen. Lip veined with purple.

To *Miltonia vexillaria radiata magnifica* (votes, unanimous), from Mrs. Haywood, Woodhatch, Reigate (gr. Mr. Salter). Flowers large, rosy-lilac, with purple lines on a white ground, radiating from the base of the lip.

Botanical Certificate.

To *Maxillaria picta* 'Warley variety,' from Miss E. Willmott. Sepals and petals yellow, barred with claret colour at the back, and marked with brownish-purple lines on the surface. Lip white, with purple spots. Broader in all its parts than the type.

To *Notylia multiflora*, from Messrs. Hugh Low. Leaves ovate. Flowers small, green and white, and arranged in a dense pendulous raceme.

Other Exhibits.

C. J. Lucas, Esq., Warnham Court (gr. Mr. Duncan), sent *Lælio-Cattleya* × 'Geoffrey' (*L. longipes Lucasiana* × *C. Warscewiczii*).

The Right Hon. Sir A. B. Crossley, Bart., M.P., Somerleyton Hall, Lowestoft (gr. Mr. Hanson), sent *Lælio-Cattleya* × 'Clive.'

J. Gurney Fowler, Esq. (gr. Mr. Davis), showed *Lælio-Cattleya* × 'Hy. Greenwood, Glebelands variety,' and *Cypripedium* × 'Penelope' (*Morgania* × *superbiens*).

Messrs. Jas. Veitch sent *Cattleya* × 'Carmen' (*Warszewiczii* × *Lüddemanniana*).

Messrs. Hugh Low showed *Phalenopsis violacea*, 'Low's variety.'

ORCHID COMMITTEE, AUGUST 1, 1905.

Mr. J. GURNEY FOWLER in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Charlesworth, Bradford, for a group of hybrid *Cattleyas*, *Odontoglossums*, &c.

Award of Merit.

To *Cattleya* × *Germania magnifica* (*granulosa* *Schofieldiana* × *Hardyana*) (votes, unanimous), from Messrs. Charlesworth. Flowers large, cream-white, tinged and veined with purple; lip veined ruby-red.

Botanical Certificate.

To *Zygopetalum* (*Promenæa*) *Rollissonii*, from Messrs. Charlesworth. Plant three inches high. Flowers whitish-yellow, with a few purple spots on the inner halves of the segments.

To *Dendrobium ciliatum annamense*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Plant dwarf, and flowers produced as in the type, but white, with a purple base to the ciliate labellum.

To *Grobysa galeata*, from Sir Trevor Lawrence, Bart. Flowers in a short raceme, one inch across, yellowish, densely spotted with purple, the upper segments being arranged helmet-like, and the lower sepals deflexed and yellow at the base.

Cultural Commendation.

To Mr. W. H. White, orchid-grower to Sir Trevor Lawrence, Bart., for a large specimen of *Platyclinis filiformis* with 109 elegant sprays of yellow flowers.

Other Exhibits.

Sir Trevor Lawrence, Bart., exhibited *Theodorea gomesioides* (*Gomesa Theodorea*, Cogn.) and other interesting species.

From the Royal Botanic Gardens, Glasnevin, Dublin. The Curator, Mr. F. W. Moore, sent *Colax triptera*.

H. S. Goodson, Esq., Putney (gr. Mr. Day), showed the blush-white *Cattleya Gaskelliana* 'Mrs. Goodson.'

Gurney Wilson, Esq., Hayward's Heath, sent a fine *Cattleya Harrisoniana*.

Messrs Hugh Low sent a good spotted *Odontoglossum Pescatorei* and other orchids.

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed *Cypripedium* × 'Miss M. Sillem' (*niveum* × *Godefroyæ*), and *Lælio-Cattleya* × *Wellsiana magnifica*.

R. G. Thwaites, Esq. (gr. Mr. Black), sent *Cattleya* × *Atalanta ignescens*.

W. A. Bilney, Esq. (gr. Mr. Whitlock), sent *Cattleya* × *Hardyana* 'Gwendolen.'

J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis), showed a fine two-flowered inflorescence of the beautiful *Brasso-Lalia Digbyano-purpurata* 'Edward VII.,' which secured a First-class Certificate, March 11, 1902. Also a very finely coloured *Lalio-Cattleya* × *callistoglossa*.

ORCHID COMMITTEE, AUGUST 15, 1905.

Mr. H. J. VEITCH in the Chair, and ten members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Major G. L. Holford, C.I.E., C.V.O., Westonbirt, Tetbury (gr. Mr. Alexander), for a fine group.

Lindley Medal.

To Mr. Alexander, orchid-grower to Major G. L. Holford, for fine culture of a remarkable specimen of *Lalio-Cattleya* × *elegans* with eighteen flower-spikes, bearing altogether 105 rose-purple flowers.

First-class Certificate.

To *Lalio-Cattleya* × 'Berthe Fournier, Westonbirt variety' (*L.-C.* × *elegans* × *C. Dowiana aurea*) (votes, unanimous), from Major G. L. Holford (gr. Mr. Alexander). Flowers of fine form and substance. Sepals and petals rich rose-purple; lip broad, crimped at the edge, ruby-purple colour, with gold lines at the base. (Fig. 54.)

Cultural Commendation.

To Mr. J. Davis, gr. to J. Gurney Fowler, Esq., Glebelands, South Woodford, for a fine specimen of *Lalio-Cattleya* × *elegans* *Turneri*.

Other Exhibits.

J. Gurney Fowler, Esq., showed *Lalio-Cattleya* × *Wavriniana* 'Fowler's variety'; and forms of *L.-C.* × *elegans*.

Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins), sent *Cypripedium* × 'Mrs. Herbert Druce'; *Cattleya Eldorado magnifica*, and *Cattleya* × *Atalanta* 'Westfield variety.'

Messrs. Jas. Veitch & Sons, Chelsea, showed *Cypripedium* × 'Jas. H. Veitch,' and *C.* × *Numa*, var. *nigra*.

F. M. Burton, Esq., Gainsborough, sent a hybrid *Cypripedium* resembling *C.* × *Bryan*.

Messrs. Hugh Low & Co. showed *Phalænopsis violacea*, 'Low's variety,' and several forms of *Odontoglossum Pescatorei* with purple-spotted labellums.

ORCHID COMMITTEE, AUGUST 29, 1905.

Mr. GURNEY FOWLER in the Chair, and thirteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Charlesworth, Bradford, for a fine group of hybrid Orchids.

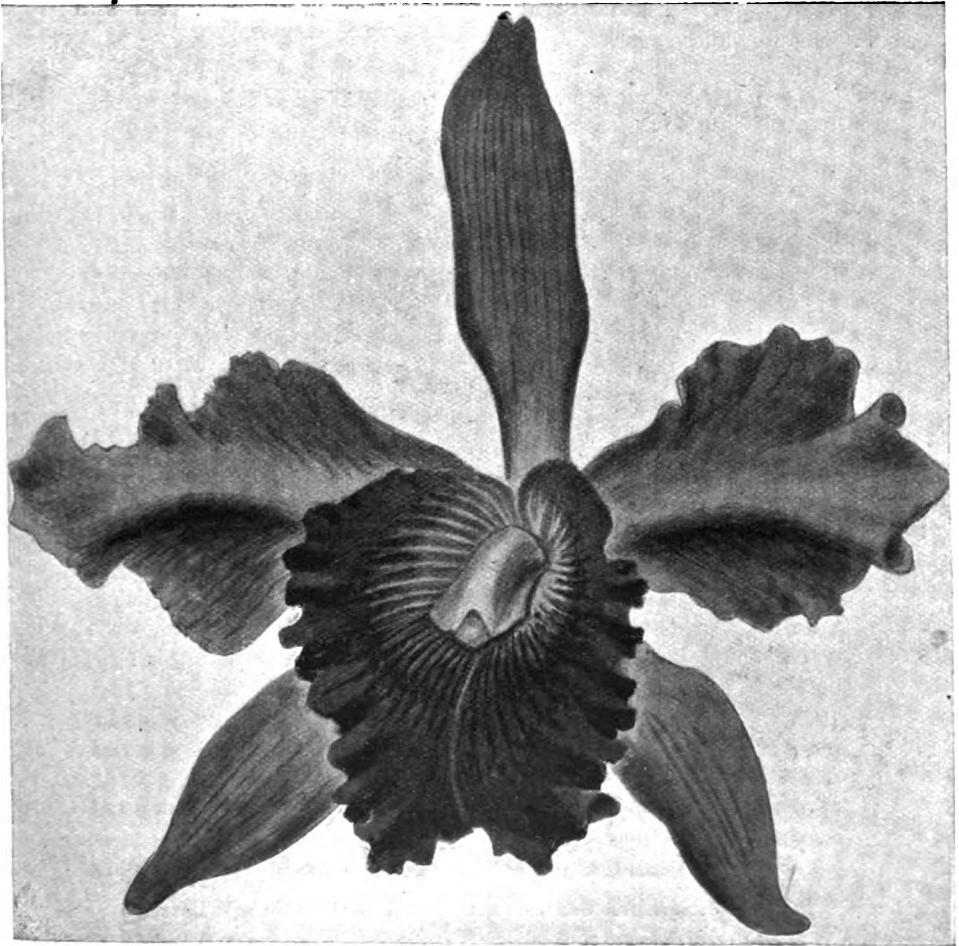


FIG. 54.—LELIO-CATTELEYA × 'BERTHE FOURNIER, WESTONBIRT VARIETY.'
(*Journal of Horticulture.*)

Bronze Banksian Medal.

To Messrs. Stanley, Southgate, for a selection of Brazilian Orchids.

Award of Merit.

To *Miltonia vexillaria* 'The Dell variety' (votes, unanimous), from Baron Sir H. Schröder, The Dell, Egham (gr. Mr. Ballantine). Flowers

white, tinged with purplish rose, and with purple lines radiating from the base of the lip; five inches in diameter.

To *Lælio-Cattleya* × 'Issy' var. *cuprea* (*L. tenebrosa* × *C. Leopoldii*) (votes, 6 for, 2 against), from Messrs. Charlesworth. Habit of *L.-C.* × *elegans*. Sepals and petals reddish-copper colour; base of lip white, front rich reddish-purple.

To *Miltonia* × *Binotii* 'Gabriel's variety' (nat. hyb. *candida* × *Regnellii*) (votes, 7 for, 0 against), from C. B. Gabriel, Esq., Easdale, Horsell, Surrey (gr. Mr. Hillier). Sepals and petals cream-yellow, barred with brown; lip violet-purple.

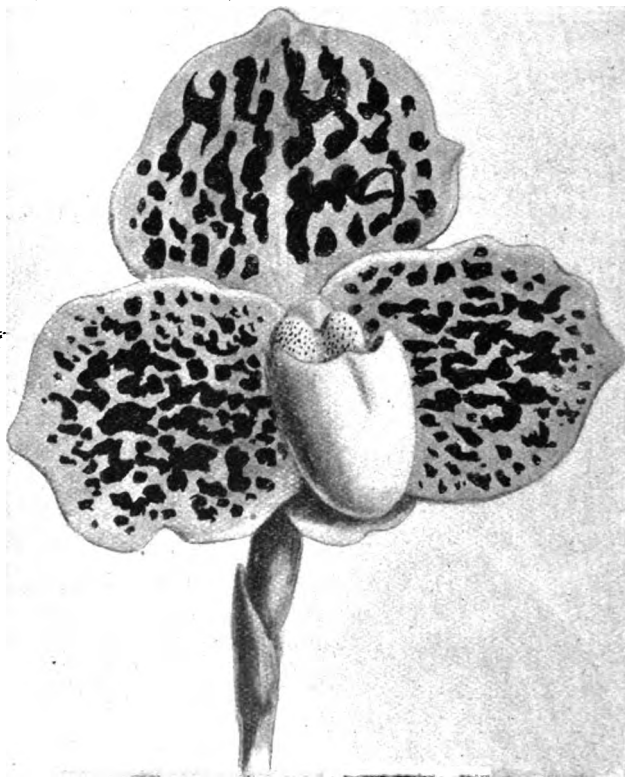


FIG. 55.—*CYPRIPEDIUM GODEFROYÆ LEUCOCHILUM* 'GOODSON'S VARIETY.'
(*Journal of Horticulture*.)

To *Cypripedium Godefroyæ leucochilum* 'Goodson's variety' (votes, unanimous), from H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. G. Day). Flowers large, pale yellow, with a broad claret-coloured reticulation on the sepals and petals. (Fig. 55.)

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed *Cypripedium* × 'Princess' *superbum* ('Mons. Coffinet' × *Fairrieianum*) and *C. concolor* *Sanderæ*.

Messrs. Sander staged a selection of *Lælio-Cattleyas*.

Messrs. Jas. Veitch showed several good *Lælio-Cattleyas*.

Messrs. Wm. Bull sent five plants of *Cattleya* × *Atalanta*.

ORCHID COMMITTEE, SEPTEMBER 12, 1905.

Mr. GURNEY FOWLER in the Chair, and eighteen members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. Sander & Sons for a collection of *Lælio-Cattleyas*, &c.

To Messrs. Stanley, Southgate, for a group.

First-class Certificate.

To *Cattleya* × *Kienstiana* 'Oakwood variety' (*Dowiana aurea* × *Lüddemanniana*) (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Chapman). Flowers large, sepals and petals dark rose; lip crimson, with yellow lines radiating from the base to the centre.

Award of Merit.

To *Cypripedium* × *villosa-Rothschildianum* (*villosum* × *Rothschildianum*) (votes, 9 for, 2 against), from Norman C. Cookson, Esq. Flowers produced like *C. Rothschildianum*, but more nearly resembling *C. villosum*. Upper sepal and petals yellow, with dark purple lines. Lip yellow, tinged red.

To *Cattleya Iris magnifica* (*bicolor* × *Dowiana aurea*) (votes, unanimous), from Major G. L. Holford, Westonbirt (gr. Mr. Alexander). Flowers bronzy yellow, with a fine crimson-purple lip. (Fig. 56.)

To *Stanhopea connata* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A large orange-coloured species with purple blotches on the globose, fleshy hypochil of the lip, and lower halves of the petal.

To *Cynoches peruvianum* (votes, unanimous), from Sir Trevor Lawrence, Bart. The plant bore a pendulous raceme of male flowers each 2 inches across; green, spotted with purple, and with a much-divided white labellum.

To *Cattleya* × *Iris inversa* (*Dowiana aurea* × *bicolor*) (votes, 9 for, 8 against), from Messrs. Sander, St. Albans. Plant dwarf. Flowers large; sepals and petals reddish-brown, with golden margin; lip purplish-crimson.

Botanical Certificate.

To *Calanthe japonica*, from Sir Trevor Lawrence, Bart. Habit of *C. veratrifolia*, but smaller. Flowers white, with a red callus on the lip of one of the specimens, and a yellow on the other plant.

To *Brassavola cucullata*, from Sir Trevor Lawrence, Bart. The fine old white species with elongated labellum, which was the type on which the genus was founded in 1818. Syn. *B. cuspidata*.

To *Oncidium Harrisonianum*, from Sir Trevor Lawrence, Bart. A dwarf floriferous species of the *O. pulvinatum* section. Flowers yellow, blotched with brown.

Cultural Commendation.

To Mr. W. H. White, orchid-grower to Sir Trevor Lawrence, Bart., for the rare *Epidendrum Laucheanum* with a pendulous raceme of over one hundred flowers.

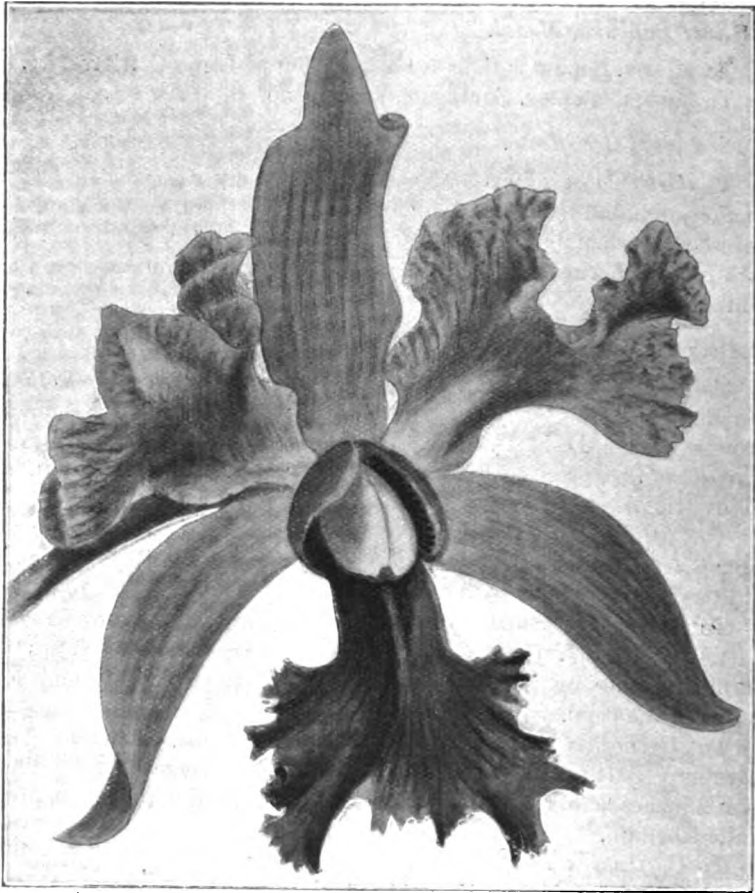


FIG. 56.—CATTLEYA IRIS MAGNIFICA. (*Journal of Horticulture*.)

Other Exhibits.

Sir Trevor Lawrence, Bart., showed fine specimens of *Miltonia vexillaria Leopoldii*, *Catasetum pileatum*, and *Cypripedium* $\times$ *Youngianum*.

Major G. L. Holford showed *Cattleya* $\times$ 'Lord Rothschild,' and other Orchids.

Francis Wellesley, Esq., showed *Cattleya* $\times$ *vestalis magnifica* and *Cypripedium* $\times$ 'Baron Schröder' var. *punctata*.

G. L. Palmer, Esq. (gr. Mr. Bannerman), showed hybrid *Cypripediums*.

H. S. Goodson, Esq., Putney (gr. Mr. Day), showed *Cattleya Harrisoniana* 'H. S. Goodson' and other Orchids.

O. L. N. Ingram, Esq. (gr. Mr. Bond), sent *Laelio-Cattleya* × *callistoglossa* var. *fulgens*.

C. J. Lucas, Esq. (gr. Mr. Duncan), showed *Cypripedium* × 'Edith Lucas.'

H. T. Pitt, Esq. (gr. Mr. Thurgood), sent *Cypripedium* 'Grace Pitt' (*Leeanum virginale* × *niveum*).

Messrs. Stanley, Southgate, showed a group of Brazilian Orchids.

ORCHID COMMITTEE, SEPTEMBER 26, 1905.

Mr. H. J. VEITCH in the Chair, and sixteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. Charlesworth, Bradford, for a magnificent group of hybrid Orchids, and rare species.

Silver Banksian Medal.

To Messrs. Sander & Sons, St. Albans, for a group.

To Messrs. Stanley, Southgate, for a group.

Award of Merit.

To *Laelio-Cattleya* × *crispo-Hardyana* (*L. crispa* × *C.* × *Hardyana*) (votes, 8 for, 8 against), from Major G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander). A fine flower, with silver-white sepals and petals, tinted with lavender. Lip broad and fringed, purple, with orange lines from the base to the centre.

To *Cattleya* × *Maronii* 'Westfield variety' (*velutina* × *Dowiana aurea*) (votes, 12 for, 1 against), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). Sepals and petals golden-yellow, with a bronze tint. Lip yellow at the base, the blade veined with crimson, the more prominent lines being raised. (Fig. 57.)

To *Miltonia Regnellii* 'Gatton Park variety' (votes, unanimous), from Jeremiah Colman, Esq., Gatton Park (gr. Mr. W. P. Bound). A remarkable variation from the type. Flowers large, sepals and petals yellow, with a small purple base; lip purple.

To *Cypripedium purpuratum* 'Tracy's variety' (votes, unanimous), from Mr. H. A. Tracy, Twickenham. An improvement on the ordinary form in size, and darker in colour.

Botanical Certificate.

To *Stenoglottis fimbriata*, from Mrs. Brightwen, The Grove, Stanmore (gr. Mr. J. W. Odell). A charming South African terrestrial Orchid, with pretty green leaves, densely spotted with purple, and arranged

rosette-like close to the pot. Each of the eight crowns bore a spike of pretty white and lilac flowers, 9 inches to 1 foot in length.

Other Exhibits.

Leopold de Rothschild, Esq. (gr. Mr. Hudson), showed the fine pure white *Dendrobium formosum*, 'Gunnersbury House variety,' and *Odontoglossum bicktoniense roseum*.

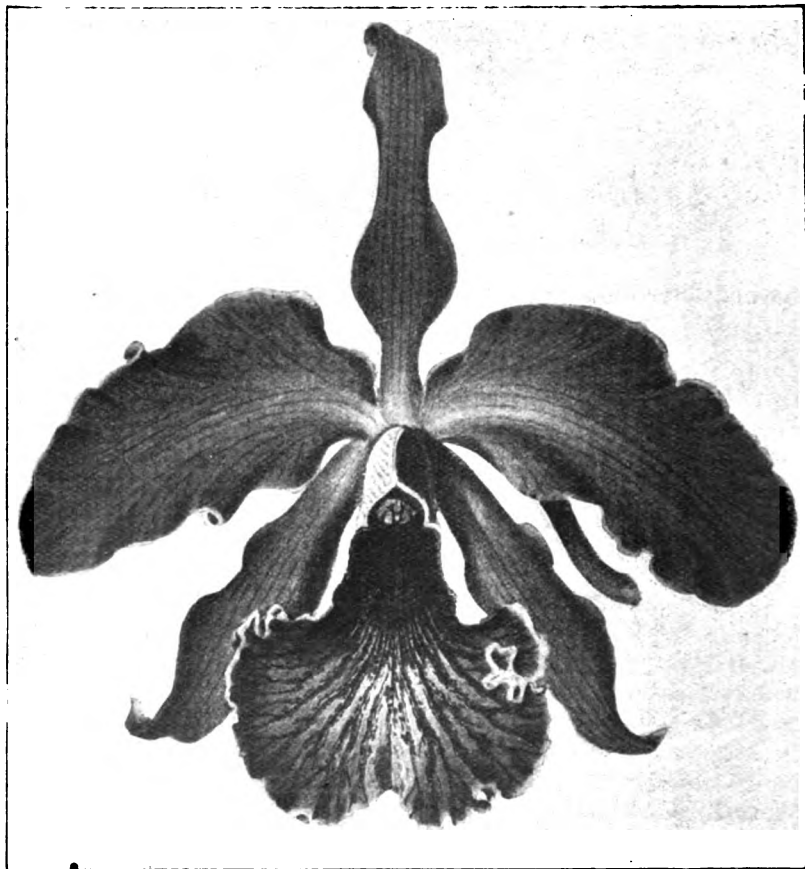


FIG. 57.—CATTLEYA × MARONII 'WESTFIELD' VARIETY.

Sir W. Marriott, Bart. (gr. Mr. Denny), sent *Cattleya* × 'Ethel' ('Rex' × *Warscewiczii*).

Major G. L. Holford (gr. Mr. Alexander) sent *Cattleya* × *Ashtonii* 'La Belle' and *L.-C.* × 'Berthe Fournier.'

Jeremiah Colman, Esq. (gr. Mr. W. P. Bound), showed *Laelio-Cattleya* × 'Nysa' from seeds sown June 26, 1901.

Mr. H. A. Tracy sent *Cypripedium* × 'Herbert Goodson' (*Sanderianum* × *Youngianum*).

ORCHID COMMITTEE, OCTOBER 24, 1905.

Mr. GURNEY FOWLER in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Baron Sir H. Schröder, The Dell, Egham (gr. Mr. Ballantine), for a fine group of Orchids.

To Jeremiah Colman, Esq., Gatton Park, Reigate (gr. Mr. Bound), for a large group of *Cypripediums*, *Lælias*, &c.

To Messrs. Charlesworth, Bradford, for a group of hybrid Orchids.

Silver Flora Medal.

To Messrs. Stanley, Southgate, for a group.

First-class Certificate.

To *Oncidium corynephorum* Lindl. (votes, unanimous), from Elijah Ashworth, Esq., Harefield Hall, Wilmslow (gr. Mr. Holbrook). A beautiful species, shown for the first time. Habit of *O. serratum* and bearing a long, flexuose, branched inflorescence of many flowers. Flowers about 1½ inch across. Sepals and petals broadly ovate and nearly equal, rose-purple, with broad white margin. Lip broad, as large as the petals, reddish-purple, base yellowish. Shown as *O. Leopoldianum*.

Award of Merit.

To *Cypripedium* × 'Germaine Opoix' ('Madame Coffinet' × *Fairrieanum*) (votes, unanimous), from Francis Wellesley, Esq. (gr. Mr. Hopkins). Dorsal sepal large, green at the base, white above, bearing many dotted purple lines. Lip and petals yellowish, tinged with purple. (Fig. 58.)

To *Cymbidium* × 'Maggie Fowler' (*giganteum* × *e'egans*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis). Flowers nearest to *C. giganteum*, but more numerous, cream-white, with close lines of red-brown on the sepals and petals and blotches of the same colour on the lip.

To *Cattleya* × 'Lord Rothschild' 'Fairy Queen' (*Gaskelliana alba* × *Dowiana aurea*) (votes, unanimous), from Messrs. Charlesworth. Flowers white, with orange disc to the lip and an irregular band of rose-purple in front.

To *Cypripedium* × 'Lord Ossulston' (*Leeanum virginale* × *Charlesworthii album*) (votes, unanimous), from the Right Hon. the Earl of Tankerville, Chillingham Castle, Northumberland. Dorsal sepal large, pure white, with small green base. Petals and sepals pale green, slightly tinged with rose.

To *Cattleya* × 'Marie Henriette de Wavrin' (*Loddigesii* × *Rex*) (votes, unanimous), from the Marquis de Wavrin, Château de Ronsele, Belgium (gr. M. De Geest). Flowers cream-white, with orange-coloured disc to the lip, in front of which is a narrow purple blotch.

To *Masdevallia cucullata* (votes, unanimous), from Jeremiah Colman, Esq. (gr. Mr. Bound). A fine species, with chocolate-purple flowers, each with a hooded green bract.

To *Dendrobium Phalaenopsis* 'Miss Louisa Deane' (votes, unanimous), from G. F. Moore, Esq. (gr. Mr. Page). Flowers blush-white, with pale rose markings on the lip.

To *Laelio-Cattleya* × 'Clive' *superba* (*L. pumila præstans* × *C. Dowiana aurea*) (votes, 10 for, 2 against), from W. M. Appleton, Esq., Weston-super-Mare. Sepals and petals rose colour. Lip large, claret colour, with gold veining at the base.

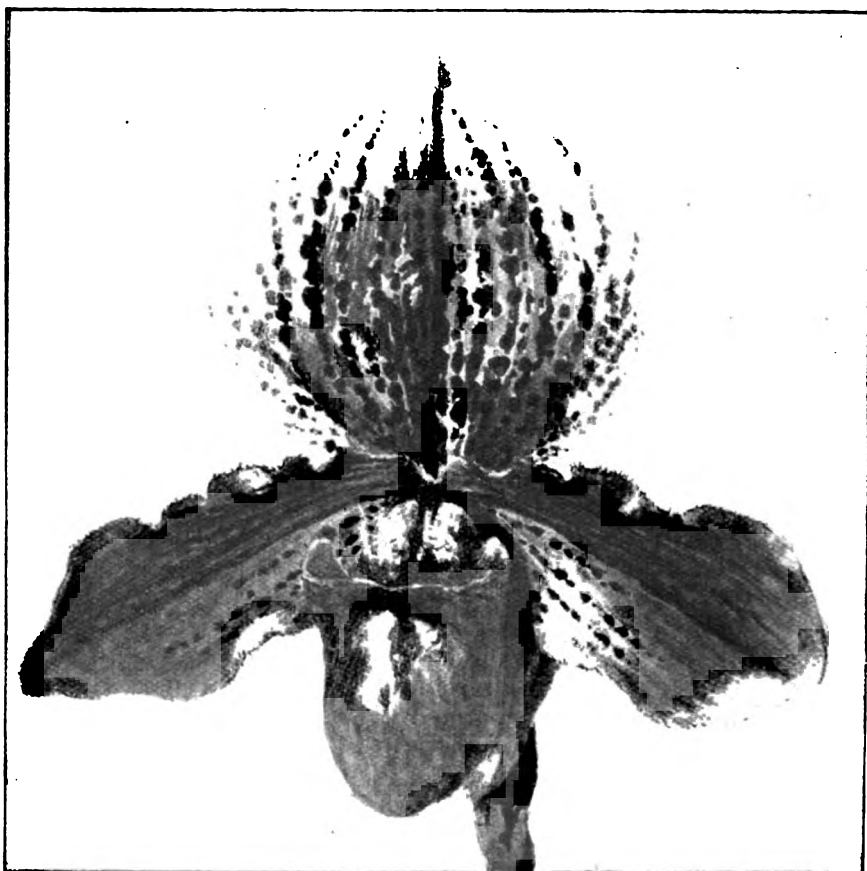


FIG. 58.—CYPRIPEDIUM × 'GERMAINE OPOIX.'

Botanical Certificate.

To *Epidendrum tricolor*, from Sir Trevor Lawrence, Bart. (gr. Mr. White). A singular species, of the habit of *Barkeria* and with a long raceme of closely arranged small cream-white flowers with red labellums.

To *Seraphyta multiflora*, from Sir Trevor Lawrence, Bart. Flowers numerous on branched spikes, greenish. Often called *Epidendrum diffusum*.

Other Exhibits.

Sir Trevor Lawrence, Bart., showed a fine selection of *Miltonias*, and a basket of *Habenaria militaris*.

The Right Hon. Lord Rothschild (gr. Mr. A. Dye) sent *Lælio-Cattleya* × *luminosa superba*.

The Right Hon. the Earl of Tankerville showed *Sophro-Cattleya* × *heatonensis*.

J. Gurney Fowler, Esq., sent several hybrid Orchids.

Sir John Edwards-Moss showed a fine *Cattleya Dowiana aurea*.

Elijah Ashworth, Esq., sent white forms of *Dendrobium Phalænopsis*.

Mrs. Collingwood, Alnwick, showed *Dendrobium Statterianum*.

A. E. Bainbridge, Esq., Newcastle, showed *Odontoglossum grande* with fifteen flowers.

Francis Wellesley, Esq., showed several hybrid *Cypripediums*.

Messrs. Hugh Low staged a group.

ORCHID COMMITTEE, NOVEMBER 7, 1905.

Mr. GURNEY FOWLER in the Chair, and twenty members present.

Awards Recommended :—

Gold Medal.

To J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whitelegge), for a very fine group of Orchids.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), for a large and well-arranged group.

Silver Flora Medal.

To Messrs. Charlesworth, Bradford, for a group, principally hybrids.

To Messrs. Cypher, Cheltenham, for a group of *Cypripediums*, &c.

Silver Banksian Medal.

To Messrs. Low, Enfield, for a group.

To M. Chas. Vuylsteke, Ghent, for hybrid *Odontoglossums*.

To Messrs. Stanley, Southgate, for a group.

First-class Certificate.

To *Odontoglossum* × *Vuylstekeæ* (parentage unknown) (votes, unanimous), from M. Chas. Vuylsteke, Ghent. A magnificent hybrid with large rich claret-coloured flowers, the blotches having thin silver-white lines between them. Probably a development of *O. × venustulum*, or the result of crossing *O. × ardentissimum* and *O. × Vuylstekeæ*. (Fig. 59.)

To *Cypripedium* × *triumphans* (*Sallieri* × *ananthum superbum*) (votes, unanimous), from R. Briggs-Bury, Esq., Accrington (gr. Mr. Wilkinson). Dorsal sepal rose-purple, with white margin and dark chocolate-purple lines. The rest of the flower tinged with reddish-purple. (Fig. 61.)

Award of Merit.

To *Cattleya* × *Peetersii* 'Mrs. Francis Wellesley' (*labiata* × *Hardyana*) (votes, unanimous), from Francis Wellesley, Esq., Westfield (gr. Mr. Hopkins). A fine winter-flowering hybrid, with purplish-rose-coloured flowers, the labellum being ruby-crimson. (Fig. 60.)

To *Cyripedium* × *Sanacdera* (*Sanactæus* × *insigne Sanderæ*) (votes, unanimous), from Norman C. Cookson, Esq. (gr. Mr. Chapman). Very near to *C. insigne Sanderæ*, but with no indication of spotting on the dorsal sepal.

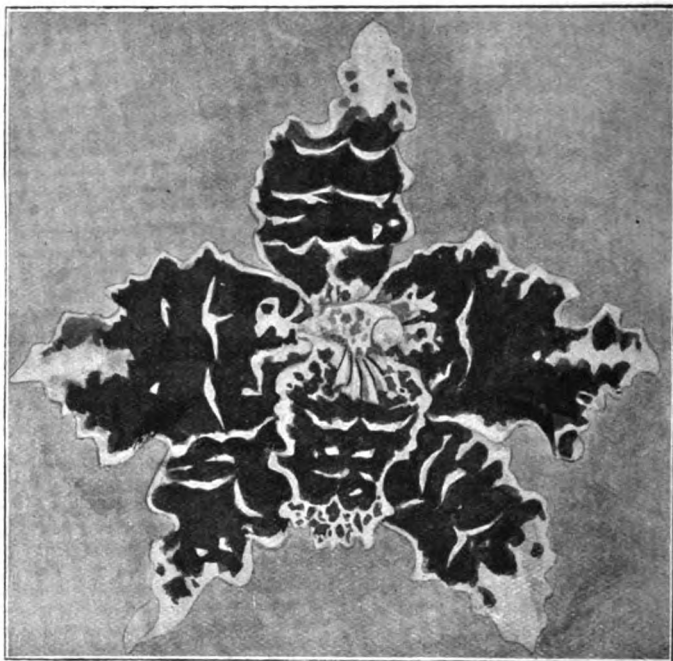


FIG. 59.—*ODONTOGLOSSUM* × *VUYLSTEKEI*. (*Journal of Horticulture*.)

To *Cattleya labiata* 'Hercules' (votes, unanimous), from J. Bradshaw, Esq. (gr. Mr. Whitelegge). A very large and perfect form of the typical rose-coloured variety.

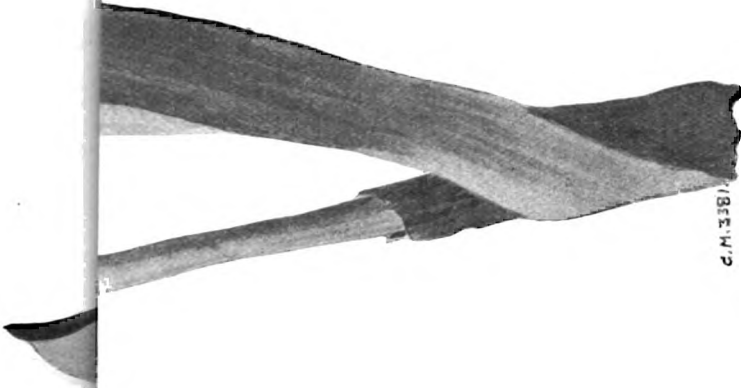
To *Dendrobium Phalaenopsis thundersleyense* (votes, unanimous), from Messrs. Hugh Low, Enfield. Flowers bright rose-purple.

Other Exhibits.

Leopold de Rothschild, Esq. (gr. Mr. Hudson), sent a basket of the winter-flowering form of *Epidendrum vitellinum* with over thirty spikes of dark orange-coloured flowers.

The Marquis de Wavrin (gr. M. De Geest) showed the white-petalled *Laelia pumila* 'Queen Alexandra.'

Baron Sir H. Schröder (gr. Mr. Ballantine) sent *Odontoglossum* × *Bingelianum* of the *O. crispo-Harryanum* class, and the dark-coloured *O.* × *Vuylstekei Schröderianum*.



C.M. 3381

FIG. 60.—CATTLEYA × PEETERSII 'MRS. FRANCIS WELLESLEY.'

(To face page cv.)

R. Briggs-Bury, Esq. (gr. Mr. Wilkinson), sent *Odontoglossum* × 'Vuykstekei variety.'

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed *Lælio-Cattleya* × 'Miss Gilberta Blount' (*L.-C.* × *Ingrami* × *C.* × *Mantini*), *L.-C.* × *Norba superba*, *Cypripedium* × 'Abraham Lincoln' ('Niobe' × *orphanum*), and other Orchids.

De B. Crawshay, Esq. (gr. Mr. Stables), sent *Odontoglossum* × *crispodinei* (*crispum* × *Coradinei*).

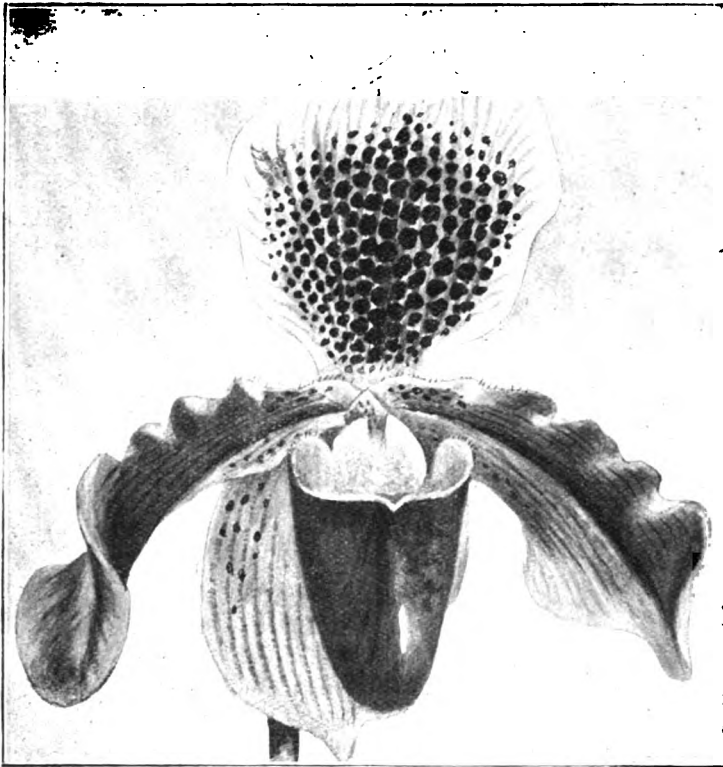


FIG. 61.—*CYPRIPEDIUM* × *TRIUMPHANS*. (*Journal of Horticulture*.)

Norman C. Cookson, Esq., showed *Lælia* × 'De Geestiana' (*flava* × *Jongheana alba*) with white sepals and petals.

F. M. Ogilvie, Esq., Oxford (gr. Mr. Balmforth), showed *Cattleya* × *Portia magnifica*.

R. I. Measures, Esq., Camberwell (gr. Mr. Smith), showed a selection of cut spikes of hybrid Orchids.

Messrs. Cowan, Gateacre, showed a fine white *Cattleya labiata* with pale-rose lip.

Messrs. William Bull, Chelsea, showed varieties of *Cattleya* × *Iris*, *Odontoglossum crispum* and others.

ORCHID COMMITTEE, NOVEMBER 21, 1905.

Mr. H. J. VEITCH in the Chair, and eighteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Charlesworth, Bradford, for a group of hybrid Orchids.

To M. Chas. Vuylsteke, Loochristy, Ghent, for hybrid *Odontoglossums*.

To Messrs. Jas. Veitch, Chelsea, for a group.

Silver Banksian Medal.

To Messrs. Low, Enfield, for a selection of *Cypripediums*, *Cattleyas*, &c.

To Messrs. Stanley, Southgate, for a group.

First-class Certificate.

To *Cypripedium* × 'The Baron' (*Hitchensiae* × *nitens* 'Sander's variety') (votes, unanimous), from Messrs. Sander, St. Albans. Dorsal sepal white, spotted with dark rose and with a green base. Petals and lip yellowish, tinged and marked with purple.

Award of Merit.

To *Disa pulchra* 'Tring Park variety' (votes, unanimous), from the Right Hon. Lord Rothschild, Tring Park (gr. Mr. A. Dye). Inflorescence a foot in height and bearing ten pale-lilac pink flowers bearing a resemblance to those of a *gladiolus*. Native of Griqualand East, South Africa.

To *Mormodes Badium* (votes, unanimous), from the Right Hon. Lord Rothschild. The type plant, bearing an erect inflorescence of ruby-red flowers. The yellow variety was shown from Tring Park, January 12, 1897, and was voted an Award of Merit.

To *Cypripedium* × *Thalia giganteum* (*insigne Chantinii* × 'Baron Schröder') (votes, 9 for, 8 against), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). Dorsal sepal broader and rounder than in any previously shown; white, with a green base and many spotted lines of rose-purple colour. (Fig. 62.)

To *Cattleya* 'Mrs. Pitt' var. *magnifica* (*Harrisoniana* × *Dowiana aurea*) (votes, 12 for, 2 against), from Major G. L. Holford, Westonbirt (gr. Mr. Alexander). Sepals and petals rose-pink; lip orange, darkest in the centre.

To *Odontoglossum* × *Hallio-crispum Theodora* (*Hallii* × *crispum roseum*) (votes, unanimous), from De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables). Flowers equal to a good *O. crispum*, primrose-yellow, spotted with red-brown.

To *Odontoglossum* × *Phæbe* (*cirrhosum* × *crispum*) (votes, unanimous), from Messrs. Charlesworth. Flowers nearest to those of *O. cirrhosum*, but with broader and shorter segments; white, tinged with pink and evenly spotted with reddish-brown.

Cypripedium × *Acteus chardwarensense* (*insigne* × *Leeanum*) (votes, unanimous), from G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Page). Flowers nearest to *C. insigne*; greenish, with white upper half to the dorsal sepal, which has a green base and some purple blotches.

Botanical Certificate.

To *Dendrobium striatum*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A singular species imported with *D. Victoria Regina*

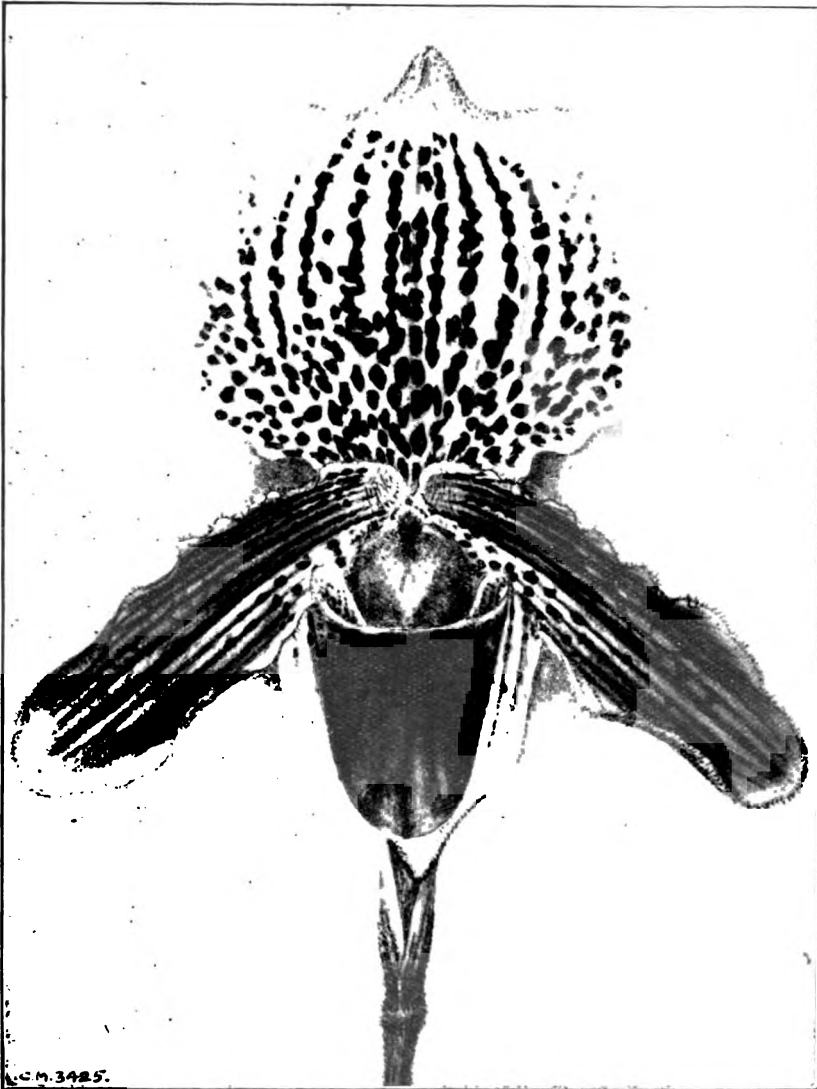


FIG. 62.—CYPRIPEDIUM × THALIA GIGANTEUM.

from the Philippines. Flowers an inch across, segments lanceolate, whitish, with well-defined red lines.

To *Disa pulchra*, from the Right Hon. Lord Rothschild. Inflorescence erect, flowers gladiolus-like, rose-pink.

Other Exhibits.

Francis Wellesley, Esq., showed several hybrid *Cypripediums*, and *Lælio-Cattleya*.

Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), sent a fine *Brasso-Cattleya* × *heatonensis* and *Cypripedium* × *Marjorie* (*insigne sylhetense* × *Leeanum superbum*).

H. S. Goodson, Esq., Putney (gr. Mr. Day), staged a small collection of Orchids.

Messrs. Sander showed *Lælio-Cattleya* × 'The Duchess' (*L.-C.* × *Hippolyta* × *C.* × *Hardyana*).

Mons. L. Cappe, Le Vesinet, France, sent *Lælio-Cattleya* × *Schneideri* (*L.-C.* × *Amelia* × *C. Dowiana aurea*).

ORCHID COMMITTEE, DECEMBER 5, 1905.

Mr. GURNEY FOWLER in the Chair, and fifteen members present.

Awards Recommended :—

Gold Medal.

To Baron Schröder, The Dell, Egham (gr. Mr. Ballantine), for a very fine group of rare Orchids.

Silver-gilt Flora Medal.

To Messrs. Cypher, Cheltenham, for a group of *Cypripediums*, &c.

Silver Flora Medal.

To Messrs. Charlesworth, Heaton, Bradford, for a group of hybrid Orchids.

First-class Certificate.

To *Vanda Sanderiana* 'Chillingham variety' (votes, unanimous), from the Right Hon. the Earl of Tankerville, Chillingham Castle, Northumberland (gr. Mr. Hunter). Flowers large and nearly circular, light rose on the upper half, and beautifully tinged and veined with reddish-purple on the lower part.

To *Odontoglossum* × *Smithii* (*Rossii rubescens* × *crispo-Harryanum*) (votes, unanimous), from Messrs. Charlesworth. A charming hybrid with flowers of good size. Sepals and petals white in the middle, banded and tipped with rose-purple and evenly spotted with chocolate-purple. Lip elongated and slightly twisted, rose-purple, with a yellow crest on a white base. (Fig. 68.)

To *Lælio-Cattleya* × *Epicasta* 'Gatton Park variety' (*O. Warscewiczii* × *L. pumila præstans*) (votes, unanimous), from Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound). Flower equal in size to *Cattleya Mendelii* and of fine form. Sepals and petals blush-white, with a slight yellowish tinge at the margin. Lip purplish-crimson in front, pale yellow at the base.

Award of Merit.

To *Cypripedium* × *Actæus* 'F. H. Cann' (*insigne magnificum* × *Leeanum giganteum*) (votes, unanimous), from G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Page). Resembling a large greenish *C. insigne*, with a broad dorsal sepal, the upper half white.

Cultural Commendation.

To Mr. Hunter, gr. to the Right Hon. the Earl of Tankerville, for *Vanda Sanderiana* 'Chillingham variety,' with five spikes, bearing together 86 flowers.

To Mr. J. Cypher, Cheltenham, for *Cypripedium* × *Leeanum giganteum* with 56 flowers.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent several hybrid *Cypripediums*, including the pretty *C.* × *Leeanum* 'Mrs. Francis Wellesley.'

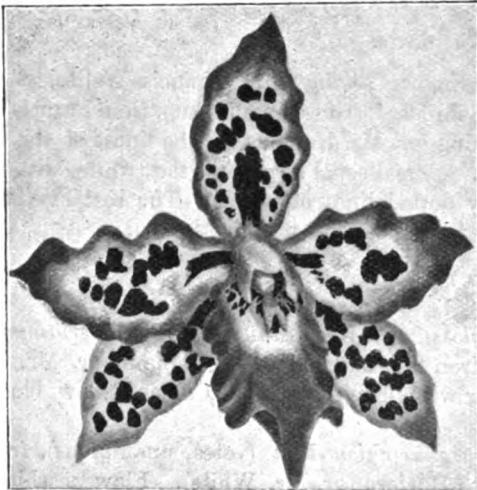


FIG. 63.—*ODONTOGLOSSUM* × *SMITHII*. (*Journal of Horticulture*.)

Mrs. Haywood, Reigate (gr. Mr. Salter), showed *Cypripedium* × 'Lady Tripp' (*Harrisianum superbum* × *Hera Euryades*).

Sir Wm. Marriott, Bart. (gr. Mr. Denny), sent *Sophro-Lælia* × *Marriottiana aurea* and two others.

Messrs. Jas. Veitch sent *Brasso-Lælia* × *Rolfei* (*L. crispa* × *B. Digbyana*).

ORCHID COMMITTEE, DECEMBER 19, 1905.

MR. GURNEY FOWLER in the Chair, and twenty members present.

Awards Recommended:—

Gold Medal.

To F. Menteith Ogilvie, Esq., The Shrubbery, Oxford (gr. Mr. Balmforth), for a fine group of *Cypripediums*, &c.

Silver-gilt Flora Medal.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), for an extensive group of *Calanthes*, *Lælia anceps*, &c.

To G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Page), for a group of *Cypripediums*.

Silver Flora Medal.

To Messrs. Cypher, Cheltenham, for a group of *Cypripediums*, &c.

To Messrs. Sander, St. Albans, for a group.

Silver Banksian Medal.

To the Hon. Walter Rothschild, M.P., Tring Park (gr. Mr. Dye), for a collection of rare *Masdevallias* and *Pleurothallis*.

To Messrs. Charlesworth, Bradford, for a group.

To Messrs. Hugh Low, Enfield, for a group.

First-class Certificate.

To *Cypripedium* × *Thalia* 'Mrs. Francis Wellesley' (*insigne Chantinii* × 'Baron Schröder') (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). The finest of the *C. Fairrieianum* race of hybrids. Dorsal sepal large and flat, white, with a shining green base and heavy dotted lines of purple. The rest of the flower honey-yellow, tinged and veined with purplish-brown.

Award of Merit.

To *Odontoglossum* × *Wilckeanum* var. *Schröderianum* (votes, unanimous), from Baron Schröder, The Dell, Egham (gr. Mr. Ballantine). A fine large flower with fringed petals. Colour yellow, blotched with red-brown.

To *Schomburgkia chionodora* (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. White). Flowers white, with a purple tint on the column; fragrant.

To *Lælio-Cattleya* × 'Clive,' 'Westonbirt variety' (*L. pumila præstans* × *C. Dowiana aurea*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. Alexander). Flowers over 6 inches across, petals 2½ inches wide, purplish-rose, with purplish-crimson front to the lip.

To *Cypripedium* × *tessellatum rubens* (*concolor* × *barbatum grandiflorum*) (votes, unanimous), from Messrs. Sander, St. Albans. Flower dark red, with a shade of yellow and some dark spotting.

To *Cypripedium insigne* 'Aberdeen' (votes, unanimous), from Drewett O. Drewett, Esq., Riding Mill-on-Tyne (gr. Mr. Renwick). Near to *C. insigne* 'Harefield Hall,' but with smaller blotches, and some rose-coloured blotches on the dorsal sepal.

To *Cypripedium* × 'Mary Lee,' 'Drewett's variety' (*Arthurianum* × *Leeanum*) (votes, 8 for, 3 against), from Drewett O. Drewett, Esq. Resembling *C. × Arthurianum* but with the upper half of the dorsal sepal white, spotted with purple.

Cultural Commendation.

To Mr. Chapman, gr. to N. C. Cookson, Esq., for *Cypripedium* × *Leeanum Clinkaberryanum* with twelve flowers.

Other Exhibits.

Sir Trevor Lawrence, Bart., sent *Schomburgkia chionodora Kimballiana*.

Francis Wellesley, Esq., showed hybrid *Cypripediums*.

Mrs. Holland, Bampton, sent hybrid *Cypripediums*.

H. T. Pitt, Esq., showed *Disa pulchra* and *Gomesa Barkeri*.

M. Chas. Vuylsteke sent hybrid *Odontoglossums*.

J. Bradshaw, Esq., showed fine plants of *Odontoglossum* × *crispoharryanum* and *Lycaste Skinneri armeniaca*.

NARCISSUS AND TULIP COMMITTEE.

MARCH 14, 1905.

Mr. H. B. MAY in the Chair, and thirteen members present.

No awards were made on this occasion, and the only exhibits coming before the Committee were a small group of forced Daffodils from Messrs. T. S. Ware, Feltham, and a pot of *Tulipa pulchella rosea* from Messrs. W. Cutbush & Son, Highgate.

A suggestion for the extension of Regulation 8 for the Standing Committees was brought forward, but its discussion was deferred until March 28, so that notice might be sent to each member.

NARCISSUS AND TULIP COMMITTEE, MARCH 28, 1905.

Mr. H. B. MAY in the Chair, and eighteen members present.

The Classification Sub-committee met for the first time, at 11.30, and classified the varieties submitted for awards.

The notice was read inviting the attendance of members on March 28 for the purpose of discussing an extension of Regulation 8 for the Standing Committees, and to consider the formation of a Tulip Sub-committee.

On the motion of Messrs. J. D. Pearson and G. Reuthe, and carried by a large majority, the Committee made the following recommendation to the Council in respect of Regulation 8: "That no member of a Committee who is the raiser of any exhibit shall be eligible to speak or vote on such exhibit, except by invitation of the Chairman."

The formation of a Sub-committee to deal only with Tulips was agreed to on the motion of Messrs. P. R. Barr and W. T. Ware. Those elected to serve were Miss Willmott, Messrs. J. T. Bennett-Poë, P. R. Barr, E. A. Bowles, F. W. Burbidge, A. Kingsmill, G. Reuthe, R. Sydenham, J. Walker, R. Wallace, and W. T. Ware.

Awards Recommended :—

Silver Flora Medal.

To Sir Josslyn Gore-Booth, Lissadell, Sligo, for a group of early Daffodils, chiefly popular varieties, but finely grown, clean and bright.

To Messrs. Barr & Sons, Covent Garden, for a group of Daffodils, comprising 'Peter Barr,' 'Ariadne,' 'Lucifer,' 'King Alfred,' 'Salmonetta,' 'White Lady,' and other new and rare varieties.

Silver Banksian Medal.

To Mr. Chas. Dawson, Gulval, Penzance, for a collection of the newer Daffodils, admirably set up. 'Homespun,' 'Sea-mew,' 'Torch,' 'Albatross,' 'Peregrine,' 'Sea King,' and 'Goldseeker' were especially good.

To Mr. G. Reuthe, Fox Hill Nursery, Keston, Kent, for a group of Daffodils, set up in large bunches.

Award of Merit.

To Narcissus *Ariadne* ' (votes, unanimous), from Messrs. Barr & Sons. A shapely, broad-crowned, creamy-white, giant Leedsii variety.

Other Exhibits.

Miss F. W. Currey, Lismore, Ireland, contributed a group of Daffodils.

Messrs. J. Ambrose & Sons, Cheshunt, showed forced Daffodils in boxes and market bunches.

Mr. Kendall, Stanhope Gardens, Kensington, staged two vases of very fine flowers of Narcissus 'King Alfred.'

NARCISSUS AND TULIP COMMITTEE, APRIL 11, 1905.

Mr. H. B. MAY in the Chair, and twenty members present.

The Chairman reported that, after receiving the Committee's recommendation of March 28, the Council made the following Regulation which will apply to all the Standing Committees :

"Regulation 8. When the merits of any exhibit raised or exhibited by a member of the Committee, or in which any member of the Committee is personally interested, are under discussion, such member shall leave the table until the Committee have arrived at a decision."

Awards Recommended :—

Silver-gilt Flora Medal.

To Miss F. W. Currey, Lismore, Ireland, for an extensive group of Irish-grown Daffodils that included a number of the newer varieties.

To Messrs. R. H. Bath, Ltd., Wisbech, for a well-arranged group of bright and well-grown Daffodils.

Silver Flora Medal.

To Rev. G. H. Engleheart, Dinton, Hants., for an interesting group of new Daffodils, chiefly unnamed varieties.

To Mr. Charles Dawson, Gulval, Penzance, for a pretty group of the newer and finer Daffodils, about three blooms of each variety being shown.

To Messrs. Hogg & Robertson, Dublin, for a bold display of the more popular Daffodils.

To Messrs. Barr & Sons, Covent Garden, for a large group of Daffodils containing several new seedlings.

Silver Banksian Medal.

To Messrs. Jas. Veitch & Sons, Chelsea, for a group of Daffodils.

To Messrs. Pope & Son, King's Norton, for a group of Daffodils, chiefly 'Ajax' varieties.

Bronze Flora Medal.

To Mrs. Backhouse, Sutton Court, Hereford, for a small group of finely grown new seedling Daffodils.

First-class Certificate.

To Narcissus 'King's Norton' (votes, unanimous), from Messrs. Pope & Son, King's Norton. A giant, golden-yellow 'Ajax' variety. (A.M., April 27, 1908.)

Award of Merit.

To Narcissus 'Lord Kitchener' (votes, unanimous), from Mrs. Backhouse, Hereford. This is well described as a bicolor 'Sir Watkin.' It is a noble flower with white perianth, and a broad crown that is lemon and sulphur yellow.

To Narcissus 'Alice Knights' (votes, 9 for, 0 against), from Messrs. Barr & Sons, Covent Garden. A light creamy-yellow 'Ajax' variety, chiefly remarkable for its earliness and the long time it lasts in good condition.

Cultural Commendation.

To Mr. R. Sydenham, Birmingham, for a group of Daffodils grown in fibre and without drainage.

Other Exhibits.

Miss Willmott, V.M.H., Great Warley, showed a group of collected forms of the neat little *Narcissus Bulbocodium*, the plants showing considerable variation.

Messrs. W. Bull & Sons, Chelsea, showed a small group of Daffodils.

Mr. Thos. Mann, Cardiff, exhibited a few Narcissus hybrids.

NARCISSUS AND TULIP COMMITTEE, APRIL 25, 1905.

Mr. H. B. MAY in the Chair, and twenty members present.

Awards Recommended :—

Gold Medal.

To Miss Willmott, V.M.H., Warley Place, Great Warley, for a splendid group of new Daffodils, including a beautiful set of large-flowered triandrous hybrids.

Silver-gilt Banksian Medal.

To Messrs. J. R. Pearson & Sons, Lowdham, Notts., for a group of very bright Daffodils.

To Messrs. Barr & Sons, Covent Garden, for a group of Daffodils.

To Messrs. R. H. Bath, Ltd., Wisbech, for a group of Daffodils.

To Messrs. Pope & Son, King's Norton, for a group of Daffodils.

Award of Merit.

To Narcissus 'Wm. Foster' (votes, unanimous), from Miss Katherine Spurrell, Norwich. A very large Incomparabilis variety with broad flat segments and a deep, spreading cup, crinkled at the edge; clear yellow.

To Narcissus 'Helen Countess of Radnor' (votes, 11 for, 0 against), from Miss Willmott, V.M.H. A very fine ivory-white 'Ajax' variety, with a long, regular trumpet, that is prettily frilled at the mouth.

To Narcissus 'Countess of Stamford' (votes, unanimous), from Mr. E. Crosfield, Little Acton, Wrexham. A shapely and well-proportioned 'Ajax' variety; creamy-white.

To Narcissus 'Banzai' (votes, unanimous), from Mr. E. M. Crosfield. An 'Ajax' variety with broad, creamy-white perianth segments, and a long primrose trumpet that has a frilled mouth.

To Narcissus 'Cornelia' (votes, unanimous), from Messrs. R. H. Bath, Ltd. A handsome 'Ajax' variety with broad perianth segments that point slightly forward; bright golden-yellow.

To Narcissus 'Marie Hall' (votes, 15 for, 1 against), from Messrs. R. H. Bath, Ltd. A triandrous hybrid, very like 'Queen of Spain' in form. Perianth creamy-white; trumpet rich sulphur-yellow.

To *Tulipa Fosteriana* (votes, unanimous), from Miss Willmott, V.M.H. A splendid species from Bokhara. It grows about 2 feet high, and produces large, brilliant scarlet flowers, with yellow base.

Botanical Certificate.

To *Tulipa dasystemom* (votes, unanimous), from Messrs. Cutbush & Son, Highgate. A low-growing species with small, pointed, yellow, white-tipped flowers that are produced freely.

Other Exhibits.

Messrs. J. Veitch & Sons, Chelsea, showed a group of Daffodils and Tulips.

Messrs. R. Wallace & Co., Colchester, showed some Tulips under the name of *T. suaveolens*, but they were regarded as not differing specifically from *T. præstans*.

BARR DAFFODIL CUP COMPETITION.

The competition for the Barr Daffodil Cup was held on this occasion. There were only two competitors, but the excellence of the exhibits led Messrs. Barr & Sons to waive their right to withhold the cup should there be less than three competitors. Mr. E. M. Crosfield, Wrexham, won the cup with an exceptionally fine display, and the Committee recommended a Silver Flora Medal as second prize to Mr. A. S. Leslie Melville, Branston, Lincs.

NARCISSUS AND TULIP COMMITTEE, MAY 9, 1905.

Mr. H. B. MAY in the Chair, and fifteen members present.

Thirty-seven varieties of Tulips were submitted for awards on this date.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. R. Wallace & Co., Colchester, for 'a well-arranged group of Tulips. 'Margaret,' 'Mrs. Farncombe Saunders,' and 'King Harold' were shown in fine form.

Silver Flora Medal.

To Messrs. Barr & Sons, Covent Garden, for a group of Tulips.

Silver Banksian Medal.

To Messrs. James Veitch & Sons, Chelsea, for a group of Tulips.

To Messrs. R. H. Bath, Ltd., Wisbech, for a group of Tulips.

First-class Certificate.

To Tulip 'Clara Butt' (votes, 7 for, 0 against), from Messrs. Walter T. Ware, Ltd., Inglescombe, Bath. A magnificent pink variety that was granted an A.M. on May 17, 1904.

Award of Merit.

To Tulip 'Claude Gillot' (votes, 7 for, 0 against), from Messrs. Walter T. Ware, Ltd. A Darwin variety with broad, rounded, bright crimson segments, and a blue base.

To Tulip 'Orange Beauty' (votes, 7 for, 0 against), from Messrs. Walter T. Ware, Ltd. A brilliant breeder Tulip, its flowers soft crimson, with a border of vivid orange round each segment.

To Tulip 'King Harold' (votes, 7 for, 0 against), from Messrs. R. Wallace & Co., Colchester. A Darwin variety, with deep red blooms of largest size.

To Tulip 'Ariadne' (votes, 8 for, 0 against), from Messrs. Barr & Sons, Covent Garden. A Darwin variety, the flowers deep and rich crimson, with dark blue base.

Other Exhibits.

Miss Willmott, V.M.H., exhibited a fine collection of late-flowering Daffodils, mostly new varieties. The group was not entered for an award.

Messrs. Dobbie & Co., Rothesay, staged a small group of Tulips, chiefly double varieties.

Messrs. Hogg & Robertson, Dublin, showed Tulips and late Daffodils.

NARCISSUS AND TULIP COMMITTEE, MAY 23, 1905.

Mr. H. B. MAY in the Chair, and twelve members present.

Tulips were largely exhibited and were the chief feature of the meeting.

The Committee unanimously recommended the Council to hold a trial of Garden Tulips at Wisley at the earliest convenient date.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. R. Wallace & Co., Colchester, for a comprehensive group of late Tulips.

To Messrs. Alexander Dickson & Sons, Newtownards, Ireland, for a group of very fine Tulips, the flowers remarkable for their large size and great substance.

Silver-gilt Banksian Medal.

To Messrs. R. H. Bath, Ltd., Wisbech, for a group of bright, clean Tulips.

To Messrs. Hogg & Robertson, Dublin, for a group of large-flowered Tulips.

Silver Flora Medal.

To Messrs. Barr & Sons, Covent Garden, for a group of Tulips that contained a selection of old English florists' varieties.

Silver Banksian Medal.

To Mr. Alex. M. Wilson, East Keal, Spilsby, for a group of Tulips.

To Mr. G. Reuthe, Fox Hill Nursery, Keston, Kent, for a small group of well-grown Tulips.

Award of Merit.

To Tulip 'Whistler' (votes, unanimous), from Mr. G. Reuthe. A big Darwin variety; rich crimson, flushed with scarlet; dark base.

To Tulip 'Quaintness' (votes, 4 for, 1 against), from Messrs. Walter T. Ware, Bath. A bright, shapely variety, with golden base, and golden border round the rosy-crimson segments.

To Tulip 'Innocence' (votes, unanimous), from Messrs. Walter T. Ware, Bath. A graceful late variety with pointed flowers that are pure white and have a yellow base.

Other Exhibits.

Messrs. J. Veitch & Sons, Chelsea, and Messrs. W. Bull & Sons, Chelsea, exhibited Tulips.

Fungoid Pests of Cultivated Plants.

By M. C. COOKE, M.A., LL.D., V.M.H., A.L.S.

8vo. 278 pp., 24 Coloured Plates (Royal Horticultural Society, Vincent Square, Westminster), Half-calf, 10s. 6d. net.

Under the above title the Royal Horticultural Society has just published an invaluable volume, the primary object of which is "to interest and instruct the cultivator in the *simplest and most practical* manner . . . by grouping the pests together according to the nature of their hosts, rather than by following any purely scientific and systematic classification, which would assume considerable previous knowledge, and would be better left in charge of an expert."

As implied by the title, the pests of cultivated plants alone are dealt with, under the following headings:—"Pests of the Flower Garden," "Pests of Garden Vegetables," "Pests of the Orchard and Fruit Garden," "Pests of the Vinery and Stove," "Pests of the Ornamental Shrubbery," "Pests of Forest Trees," "Pests of Field Crops." Then follows a chapter on "Fungicides," which explains very clearly how to make the different washes and sprays, and also gives the proportions in which the various ingredients should be used.

Special attention is directed to the Coloured Plates, which illustrate no less than 957 different fungoid diseases to which cultivated plants are liable; and there are also 23 other Illustrations in Black and White in the text.

Mr. G. MASSEE, F.L.S., V.M.H., the distinguished mycologist at Kew, in reviewing this work, speaks thus of it: "The book is printed on good paper, well bound in half-calf, and is in every sense a credit to its author and to the Royal Horticultural Society under whose auspices it has appeared."

To be had of the Royal Horticultural Society at their Hall in Vincent Square, Westminster, S.W., free by post 10s. 6d. half-bound in calf.

FORM OF RECOMMENDATION.

[This Form can be easily detached for use.]

THE ROYAL HORTICULTURAL SOCIETY.

Established
A.D. 1804.



Incorporated
A.D. 1809.

VINCENT SQUARE, WESTMINSTER, S.W.

Telegrams: "HORTENSIA, LONDON." Telephone No.: 5863, Westminster.

Form of Recommendation for a FELLOW of the ROYAL HORTICULTURAL SOCIETY.

Name

Description

Address

being desirous of becoming a FELLOW of the ROYAL HORTICULTURAL SOCIETY, we whose Names are underwritten beg leave to recommend him (her) to that honour; he (she) is desirous of subscribing *
Guineas a year.

Proposed by

Seconded by

- * Kindly enter here the word *four* or *two* or *one*.

It would be a convenience if the Candidate's Card were sent at the same time.

Signed on behalf of the Council, this day of 190

..... CHAIRMAN.

[P.T.O.]

THE ROYAL HORTICULTURAL SOCIETY.

Privileges of Fellows.

- 1.—Anyone interested in Horticulture is eligible for election, and is invited to become a Fellow.
- 2.—Candidates for election are proposed by two Fellows of the Society.
- 3.—Ladies are eligible for election as Fellows of the Society.
- 4.—The Society being incorporated by Royal Charter, the Fellows incur no personal liability whatsoever beyond the payment of their annual subscriptions.
- 5.—Forms for proposing new Fellows may be obtained from the Offices of the Society, Vincent Square, Westminster, S.W.
- 6.—If desired, the Secretary will, on receipt of a letter from a Fellow of the Society suggesting the name and address of any lady or gentleman likely to become Fellows, write and invite them to join the Society.

FELLOWS.

A Fellow subscribing Four Guineas a year (or commuting for Forty Guineas) is entitled—

- 1.—To ONE Non-transferable (personal) Pass and FIVE Transferable Tickets admitting to all the Society's Exhibitions, and to the Garden.
N.B.—Each Transferable Ticket or Non-transferable personal Pass will admit three persons to the Gardens at Wisley on any day *except* days on which an Exhibition or Meeting is being held, when each Ticket or Pass will admit One Person only. The Garden is closed on Sundays, Good Friday, and Christmas Day.
- 2.—To attend and vote at all Meetings of the Society.
- 3.—To the use of the Libraries at the Society's Rooms.
- 4.—To a copy of the Society's JOURNAL, containing the Papers read at all Meetings and Conferences, Reports of trials made at the Garden, and descriptions and illustrations of new or rare plants, &c.
- 5.—To purchase, at reduced rates, such fruit, vegetables, and cut flowers as are not required for experimental purposes.
- 6.—To a share (in proportion to the annual subscription) of such surplus or waste plants as may be available for distribution. Fellows residing beyond a radius of 35 miles from London (by the A B C Railway Guide) are entitled to a double share.
- 7.—Subject to certain limitations, to obtain Analysis of Manures, Soils, &c., or advice on such subjects, by letter from the Society's Consulting Chemist, Dr. J. A. Voelcker, M.A., F.I.C.
- 8.—To have their Gardens inspected by the Society's Officer at the following fees:—One day, £3. 8s.; two days, £5. 5s.; *plus* all out-of-pocket expenses.
- 9.—To exhibit at all Shows and Meetings, and to send seeds, plants, &c., for trial at the Society's Garden.
- 10.—To recommend any ladies or gentlemen for election as Fellows of the Society.

A Fellow subscribing Two Guineas a year (or commuting for Twenty-five Guineas) is entitled—

- 1.—To ONE Non-transferable Pass and Two Transferable Tickets.
- 2.—To the same privileges as mentioned in Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, as above.

A Fellow subscribing One Guinea a year, with an Entrance Fee of £1. 1s. (or commuting for Fifteen Guineas), is entitled—

- 1.—To ONE Transferable Ticket (in lieu of the non-transferable personal Pass), and the privileges mentioned in Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, as above.
[*Bond fide* Gardeners earning their living thereby, and persons living permanently abroad, are exempt from the payment of the Entrance Fee.]

ASSOCIATES.

An Associate subscribing 10s. 6d. a year is entitled—

- 1.—To ONE Non-transferable Pass, and to privileges as mentioned in Nos. 3, 4, and 9.
N.B.—Associates must be *bond fide* Gardeners, or employes in a Nursery, Private or Market Garden, or Seed Establishment, and must be recommended for election by Two Fellows of the Society.

Local Horticultural and Cottage Garden Societies may be Affiliated to the Royal Horticultural Society, particulars as to which may be had on application.

ESTABLISHED
1804.



INCORPORATED
1809.

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

- | | |
|---|-------------------------------------|
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| 11. The Society's Garden at Wisley. | 27. Inspection of Fellows' Gardens. |
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| 13. Poppy Seed. | 29. Fungoid Pests. |
| 14. The Society's New Home. | 30. Rules for Judging. |
| 15. Exhibitions, Meetings, and Lectures
in 1907. | 31. Varieties of Fruits. |
| 16. The Temple Show. | 32. Other Publications. |
| | 33. Advertisements. |

1. NOTICES TO FELLOWS.

A page or so of Notices to Fellows is always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on *all* subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number **5363, WESTMINSTER.**

"HORTENSIA, LONDON," is sufficient address for telegrams.

4. JOURNALS WANTED.

The Secretary would be very greatly obliged for any of the following back numbers:—Vol. V., Part 1; Vol. VII., Part 2; Vol. X.; Vol. XIII., Part 1; Vol. XVI., Parts 2 and 3; Vol. XVII., Parts 1 and 2; Vol. XVII., Parts 3 and 4; Vol. XIX., Part 1; Vol. XIX., Part 2; Vol. XX., Part 3; Vol. XXII., Part 3; Vol. XXII., Part 4; Vol. XXV., Part 3; Vol. XXVI., Part 4; Vol. XXVII., Part 1; Vol. XXVII., Part 4; Vol. XXVIII., Parts 3 and 4; and Vol. XXIX., Parts 1, 2, and 3.

5. SUBSCRIPTIONS.

All Subscriptions fall due on January 1 of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments, or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Forms for the purpose may be obtained from the R.H.S. Offices at Vincent Square, Westminster, S.W. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society" and crossed "London and County Bank, Westminster."

6. REPORT OF THE CONFERENCE ON HYBRIDISATION AND CROSS-BREEDING.

See important notice on p. ccxxiv.

7. FORM OF BEQUEST.

Two very welcome bequests were received during last year, one of £250 under the will of the late Mrs. Begley, of St. Peter's Square, Hammersmith; the other of £50 under the will of the late Mr. J. Cohen, of St. Mark's Crescent, Regent's Park. The Council venture to remind Fellows of this way of handing on the benefits and enjoyment of the Society to future generations.

The following Form of Bequest may be of service to some :—

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £ , to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease ; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

8. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at p. ccxxii, and fuller ones at page 10 in the "Book of Arrangements."

9. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the addresses insufficient, they are requested to inform the Secretary at once. Another use which all Fellows might make of this list is to consult it with reference to their friends' names, and if any of them are not found recorded therein they might endeavour to enlist their sympathies with the Society, and obtain their consent to propose them as Fellows forthwith. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL (see pp. ccv, ccvi above) and with the "Book of Arrangements," each year.

10. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows ; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially in

1. Providing a properly equipped Horticultural Research Station at the Wisley Garden.

The Council have already got out the plans for the building, and are ready at any moment to begin operations, but the *initial* cost of the Laboratory and other buildings, and of the necessary instruments, can hardly be far short of £1,500 or £2,000, and the *annual* expense for salaries and general upkeep would involve at least £500 a year. Mr. Arthur W. Sutton, F.L.S., V.M.H., has most kindly offered £100 towards starting a fund for the Laboratory buildings, and *we hope that others will now be ready to follow so good a lead* without further delay, so that the students being trained in the Gardens may thus have the additional advantage of an insight into the methods of modern scientific research.

2. A photographic outfit is wanted at Wisley ; and

3. Books are required to fill the gaps in the Library.

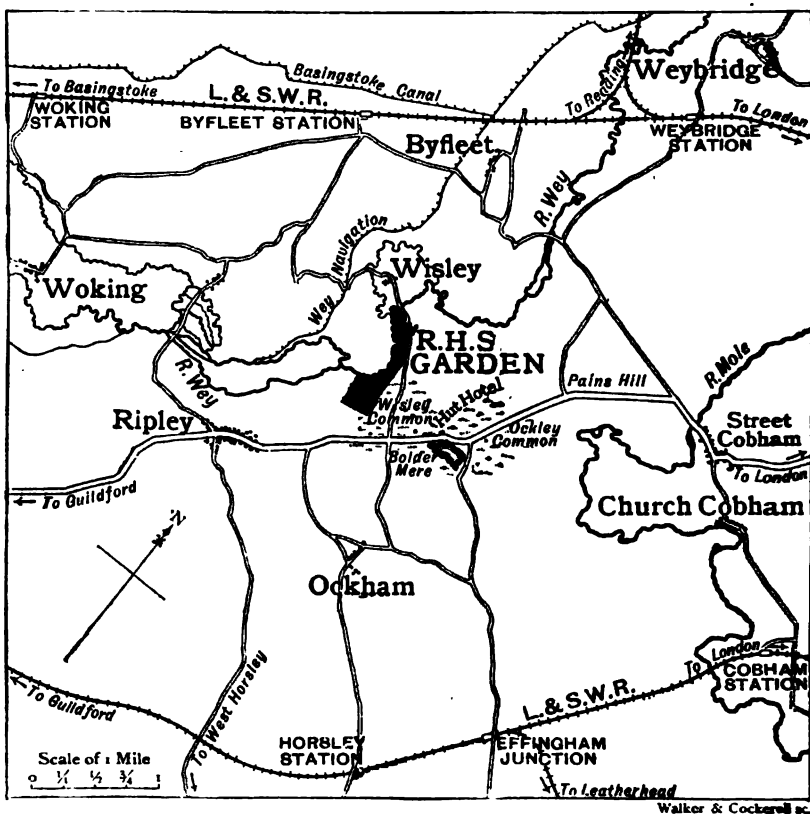
* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

Thus there is plenty for all to do according to their individual liking : personal effort, money, plants, books, are all alike needed. The Secretary, therefore, asks those who read these lines to do their best to help in any of the manners above indicated.

11. THE SOCIETY'S GARDEN AT WISLEY.

(NOT OPEN ON SUNDAYS.)

The Garden is open daily to Fellows and others showing Fellows' Transferable Tickets from 9 A.M. till sunset, except on Sundays, Good Friday, and Christmas Day. Each Fellow's ticket admits three to the Garden. The public are not admitted. There is much of interest to be seen at Wisley throughout the year. The late Mr. G. F. Wilson's garden



POSITION OF THE SOCIETY'S GARDEN.

included a wild wood-garden, a bank of flowering shrubs, a series of ponds and pools, and a fine collection of Japanese Iris, Primulas, Lilies, Rhododendrons, &c. The Society has added a complete set of the best varieties of hardy fruit trees and bushes, and of Roses and other ornamental trees and flowering shrubs, for the most part kindly given by the leading nurserymen. A very large sum of money has also been spent in the

erection of a fine series of glass-houses; of a dwelling-house for the Superintendent; a cottage for the Fruit Foreman; and in establishing a complete system of water supply and drainage works, and in road-making.

The Garden is situated about 2 miles from Ripley; and about $8\frac{1}{2}$ miles from Horsley and $5\frac{1}{2}$ miles from Weybridge, both stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. White, fly proprietor, Ripley, Surrey; the charge being, to and from Weybridge 10s., or to and from Horsley 7s. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Garden, and also at the Hautboy at Ockham.

12. DISTRIBUTION OF SURPLUS PLANTS.

In their Report for 1905 the Council drew the attention of Fellows to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock which must either be given away or go to the waste heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematise this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants? It was therefore decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by ballot.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot, and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is therefore obvious that when the Ballot is kind to any Fellow he will receive all the plants exactly as he has chosen, but when the Ballot has given him an unfavourable place he may find the stock of the majority of plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been complied with, and are then balloted in a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next distribution. The work of the Garden cannot be disorganised by the sending out of plants at any later time in the year. All Fellows can participate in the Annual Distribution *following* their election.

Fellows are particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution.

Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution was established. The great majority also are of necessity *very small*, and may require careful treatment for a time.

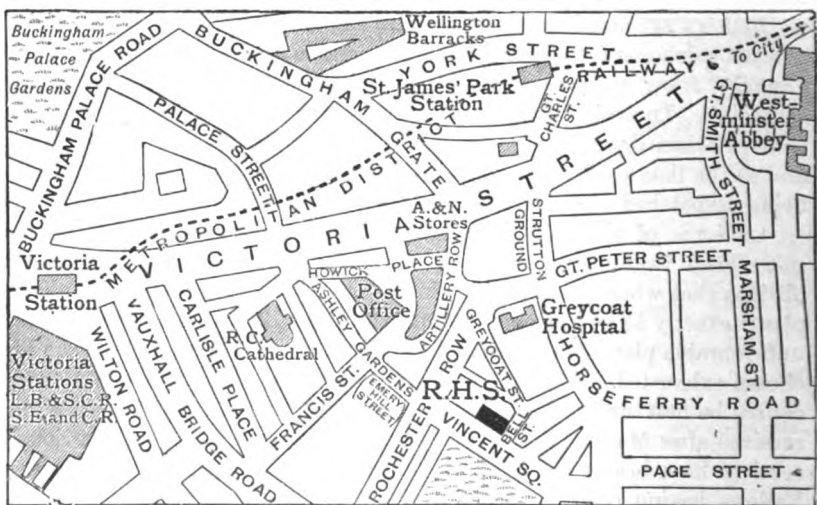
The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

13. POPPY SEED.

The Secretary will be pleased to send a packet of his 1906 crop of Shirley Poppy Seed to any Fellows who like to send to Rev. W. WILKS, Shirley Vicarage, Croydon, a stamped envelope ready addressed to themselves. The seed should be sown as early as possible in March. This is an offer made by the Secretary in his private capacity, and it causes much inconvenience when requests for seed are mixed up with letters sent to the office in London, instead of as above directed.



POSITION OF THE SOCIETY'S HALL.

14. THE SOCIETY'S NEW HOME.

The Royal Horticultural Hall is now occupied by the Society for its Shows, Meetings, Library, and Offices. Vincent Square lies straight

through Ashley Gardens from Victoria Street, Westminster, and is about five minutes' walk from the Victoria and St. James's Park Stations. The accommodation for the Shows is double what it was in the old Drill Hall. The Lectures are delivered in a room specially equipped and devoted to that purpose, and the Library is now housed in a manner worthy of the unique and valuable collection of books which it contains, and as the shelf accommodation is at least double what it was in Victoria Street the Council hope that all Fellows will send such horticultural and botanical books as they can spare from their own shelves, as well as any articles and papers they may themselves publish on such subjects.

15. EXHIBITIONS, MEETINGS, AND LECTURES IN 1907.

A full programme for 1907 will be issued about the end of January 1907 in the "Book of Arrangements" for 1907, but the following dates have been fixed, viz.: January 8, 22; February 12 (Annual Meeting); March 5, 19; April 2, 16 (Special Prizes for Daffodils), 30; May 14, 28-30 (Temple Gardens Show); June 11, 18-14 (Show of Colonial-Grown Fruit), 25; July 9-10 (Summer Show at Holland House), 23; August 6, 20; September 3, 17; October 1, 15, 17-18 (Show of Home-Grown Fruit), 29; November 12, 26, 28-29 (Show of Colonial-Grown Fruit); December 10, 31. It will be noticed that an Exhibition and Meeting is held in the Royal Horticultural Hall practically every fortnight throughout the year, and a short lecture on some interesting subject connected with horticulture is delivered during the afternoon. Special Fruit and Flower Shows have also been arranged on days other than those of the Society's own Exhibitions.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (80) of halfpenny cards *ready addressed* to himself.

16. THE TEMPLE SHOW.

The twentieth great annual Flower Show in the Inner Temple Gardens, Thames Embankment, will be held, by kind permission of the Treasurer and Benchers of the Inner Temple, on Tuesday, Wednesday, and Thursday, May 28, 29, and 30.

As on previous occasions, a large number of Silver Cups and Medals will be awarded according to merit. The VEITCHIAN CUP, value 55 guineas, will also be awarded on this occasion.

Fellows of the Society are admitted free on showing their tickets. N.B.—Each Personal Pass is strictly non-transferable, and will admit only the Fellow to whom it belongs, but no one else. Fellows' *Transferable Tickets* are available for themselves or a friend. The general public are admitted by purchased tickets:—On Tuesday, May 28, from 12.30 to 7 P.M., 7s. 6d. On Wednesday, from 9 A.M. to 7 P.M., 2s. 6d. On Thursday, from 9 A.M. to 6 P.M., 1s.

To avoid the inconvenience of crowding, tickets may be obtained beforehand at the Society's Offices, Vincent Square, Westminster, S.W.

The Offices at Westminster will be closed on the days of the Show, and consequently no letters should be addressed there on the previous day.

On the days of the Show, tickets will only be on sale near the entrance to the Gardens (Thames Embankment Gate).

Members of Affiliated Societies, and *bona fide* Gardeners, may obtain 2s. 6d. tickets for 1s., which will admit them to the exhibition on Wednesday. Members of Affiliated Societies *must* apply *only through the Secretary of their own Society* if they wish to take advantage of this privilege. These tickets *can only be obtained* on or before May 25 *from the Society's Office*, Vincent Square, Westminster, S.W., and a large stamped and directed envelope must be sent with Postal Order in every case.

17. HOLLAND HOUSE SHOW, 1907.

By the kind permission of the Earl and Countess of Ilchester the Summer Show will be held at Holland House on July 9 and 10, full particulars of which will be published in the "Book of Arrangements," 1907. The rules for the Temple Show apply as far as possible to Holland House, but there is sufficient space to allow of a Sundries Tent.

18. SPECIAL CUPS IN 1907.

(1) THE BARR CUP FOR DAFFODILS.

Messrs. Barr & Sons have again presented to the Society a £7 7s. Silver Cup to be awarded on April 16, 1907, for a group of Daffodil blossoms grown entirely outdoors (*Polyanthus* varieties excluded); must include some of each section, Magni-, Medio-, and Parvi-Corónati; must contain at least 80 varieties distinct, at least three blooms of each must be shown. Not more than nine blooms of any one variety may be put up. To be staged in bottles, vases, or tubes, not exceeding three inches in diameter at the top (inside measurement), and all the stems must touch the water. Quality of flower will count more than quantity, and correct naming and tasteful arrangement will be duly considered. Any hardy foliage may be used, Daffodil or otherwise. No prize will be awarded unless there are three competitors at least. This class will be open to amateurs and gentlemen's gardeners only. The Society adds a Silver Flora Medal as a Second Prize.

(2) THE WATKINS & SIMPSON CUP.

Messrs. Watkins & Simpson have kindly offered to the Society a Ten Guinea Cup for the best exhibit of Annuals, and plants usually treated as Annuals, grown in pots (Sweet Peas excluded), to be shown at the Society's Meetings on May 14, June 11, and June 25, 1907. The exhibitor may show, on each or either of the dates mentioned, a collection of not more than 24 distinct varieties (not more than 8 pots of any one variety) in pots not exceeding 6 inches in diameter. No collection, therefore, can exceed 72 pots in all on any one date, but the same exhibitor may exhibit again if he pleases on the other dates fixed. Marks will be given on each date, and the exhibitor obtaining the highest total,

whether obtained on one of the days or on two or by exhibits on all three, will be held to be the winner. The Cup is presented with the idea of showing what interesting and charming plants there are amongst this common class of flowers, when well grown and with plenty of room individually, instead of in the too often crowded style, when perhaps twenty plants may be found striving to grow in the space required by one.

In order that there may be no mistake as to what is intended by "Annuals and plants usually grown as Annuals," a representative list is given on page 84 of the "Book of Arrangements" for 1906.

(3) THE VEITCHIAN CUP.

The Veitchian Cup was offered to the President and Council of the Royal Horticultural Society in the year 1903 in commemoration of the fiftieth anniversary of the commencement of the Chelsea house by James Veitch, Jun., the nurseryman. The Cup, silver-gilt of the Georgian period with traces of the Greek, was designed in 1810.

The object of the gift is to recognise in an exceptional degree exhibits of the highest order from amateurs—either a single plant, a group, or series of groups equally eligible—in the opinion of specially chosen and eminent judges at the Temple Show.

The judges' decision is final, and the Cup may be withheld at their discretion.

The judges will not award this high distinction unless satisfied and assured that the exhibit is, in the main, due to the work and capability of the exhibitor, exhibitors, or their legitimate employes; on this point the judges may consult any expert not eligible to win the Cup.

The judges need not give a decision till the third day of the Show.

(4) THE SHERWOOD CUP.

The £10 10s. Silver Cup which N. N. Sherwood, Esq., V.M.H., has for the past nine years given to the Society, will be awarded at the Holland House Show in July 1907 for the best collection of hardy herbaceous and bulbous plants cultivated in pots or tubs. A background of other foliage plants will be allowed. The whole must be grouped on a space not exceeding 400 square feet.

19. LETTING OF THE HALL.

Fellows are earnestly requested to make known among their friends and among other institutions that the ROYAL HORTICULTURAL HALL is available, twelve days in each fortnight, for Meetings, Shows, Exhibitions, Concerts, Conferences, Lectures, Balls, Banquets, Bazaars, Receptions, and other similar purposes. The Hall has a floor surface of 18,000 square feet. It is cool in summer and warm in winter. For a Concert it will seat 1,500, or for a public meeting 2,000. It is undoubtedly the lightest Hall in London, and its acoustic properties have been pronounced excellent by some of our greatest authorities. The charges, which are very moderate, include lighting, warming in winter or cooling of the air in

summer, seating, and use of trestle-tabling and flat platform ; but an extra charge is made for putting up and taking down the stepped platform. The first floor, consisting of four fine rooms, may also be hired for similar purposes, either together with or separately from the Great Hall. This accommodation can also be divided up if desired. Ample cloak rooms for ladies and for gentlemen are available. In fact, the Hall is not only the most suitable Hall in London for special shows of a high-class character, but it is also second only to the Queen's Hall and the Royal Albert Hall for the purposes of Concerts and Meetings. Reduction is made to Charities, and also to Societies kindred or allied to horticulture. The regulations &c. for hiring the Hall are printed in the "Book of Arrangements," and full particulars may be obtained on application to the Secretary, R.H.S., Vincent Square, Westminster, S.W., with whom dates may be booked.

20. HALL ACCOMMODATION.

The area of the GREAT HALL with its Annexes is 18,000 square feet. The London County Council have granted a Music and Dancing Licence, so that money may be taken at the door. Turnstiles are provided when required. A Dramatic Licence can also be obtained on application. The Building is specially adapted for the holding of Shows and Exhibitions, Concerts and Entertainments, Bazaars, Conversaciones, Dances and Banquets, and can be fitted as follows :

For CONCERTS and ENTERTAINMENTS, a platform and seating for 1,200 to 1,500 as required. The stepped platform superstructure is similar to that formerly at St. James's Hall.

For SHOWS and EXHIBITIONS, tabling and stepped staging are provided, for the lighting of which, when required, extra electric cables have been laid on. The walls are also fitted with rods for the display of pictures, photos, and other illustrations.

Gas mains are laid on all over the Great Hall and the eastern Annexe and Lecture Room for cookery purposes and exhibitions requiring heat.

For RECEPTIONS, BALLS, &c., a Parquet Dancing Floor can be arranged. The Annexes can be used for crush rooms or for serving of refreshments, and the Lecture Room and Committee Rooms on first floor as supper or retiring rooms.

A Gallery for an Orchestra or Band is provided at the east end of the Hall.

Large Cloak Rooms occupy the front of the Basement.

The LECTURE ROOM is provided with an electric lantern, and with gas, water, and electric cables for purposes of demonstration. Seating provided for 175 persons.

The COUNCIL and COMMITTEE ROOMS are specially adapted and furnished for Company Meetings, Committees, Arbitrations, &c., and will seat from 50 to 120 persons.

The whole of the FIRST FLOOR may be hired with a separate entrance for At Homes, Weddings, and other Receptions, Conferences, and such-like gatherings. It may also be taken at the same time as the Great Hall, with which it communicates by a special staircase.

21. HALL ENGAGEMENTS FOR 1907.

The Hall has already been engaged for the following dates in 1907 :

- Jan. 1. Wimbledon Canine Association Dog Show.
 „ 5. Reunion of the Clarion Vans Committee.
 „ 10-11. Southern Counties Cat Club Show.
 „ 15-16. National Terrier Club Show.
 „ 24. St. Margaret's Musical Society Concert.
 „ 26. Dance in aid of the Teachers' Orphanages.
 Feb. 17. }
 to } South African Products Exhibition.
 Mar. 16. }
 April 9. Ladies' Kennel Association, Members' Show.
 „ 11. French Bull Dog Club Show.
 „ 20-27. Tobacco Exhibition.
 May 6-10. Chemists' Exhibition.
 May 18. }
 to } Travel Exhibition.
 June 8. }
 „ 19. St. Margaret's Musical Society Concert.
 July 5-11. London University Examination.
 „ 16. National Sweet Pea Society's Show.
 „ 24. National Carnation Society's Show.
 Sept. 24. National Rose Society's Autumn Show.
 Oct. 7-11. London Medical Exhibition.
 Nov. 18-22. Beauty and Health Exhibition.

Several other Concerts, Exhibitions, Sales of Work, &c., are under negotiation, and early application from lessees is requested in order to prevent disappointment.

22. COLONIAL-GROWN FRUIT SHOWS.

The President and Council have decided to hold Shows of Colonial-grown Fruit at their New Hall on June 18 and 14, and November 28 and 29, 1907.

The object of fixing these dates is, if possible, to suit the season which is most likely to find the produce of Canada, British Columbia, and the West Indies; of India and the Cape; and of Australia, Tasmania, and New Zealand, in the greatest perfection in London. Opportunity is afforded for each Colony to make collective exhibits in addition to the exhibits of individual firms. The Agents General and Crown Agents are most kindly rendering every assistance, and we trust that both growers and shippers will do their best to send in exhibits worthy of our Colonies, and to show what can be produced for the Home markets. No entrance fee or charge for space is made, and tabling is also provided free of expense. If desired any produce may be consigned direct to the Society, and it will be stored in the cellar at Vincent Square and staged by the Society's

officials, but the Society cannot undertake to repack and return any exhibits. Medals and other Prizes are offered by the Council in each class.

23. LECTURES.

The new Lecture Room is fitted with an electric lantern of the most modern construction; electric current, gas, and water are laid on, and every provision has been made for the due illustration and delivery of Lectures.

Any Fellows willing to Lecture, or to communicate Papers on interesting subjects, are requested to communicate with the Secretary.

24. EXAMINATIONS.

1. The Society will hold an examination on Monday, January 14, 1907, specially intended for gardeners employed in Public Parks and Gardens belonging to County Councils, City Corporations, and similar bodies. This examination will be conducted in the Royal Horticultural Society's Hall, Vincent Square, Westminster, S.W. No entry can be accepted after December 31, 1906.

2. The Society's Annual Examination in the Principles and Practice of Horticulture will be held on Wednesday, April 10, 1907. Candidates should send in their names not later than March 1. Full particulars may be obtained by sending a stamped and directed envelope to the Society's offices. Copies of the Questions set from 1898 to 1905 (price 1s. 9d., or 10s. a dozen) may also be obtained from the office. The Society is willing to hold an examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

In connection with this examination a scholarship of £25 a year for two years is offered by the Society to be awarded after the 1907 examination to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of 18 and 22 years, and that he should study gardening for one year at least at the Royal Horticultural Society's Garden at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is approved by the Council of the Royal Horticultural Society. In case of two or more eligible students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

3. The Society holds an Examination in Cottage and Allotment Gardening on Wednesday, April 24, 1907. This examination is intended for, and is confined to, Elementary and Technical School Teachers. It is undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence of any test whatever of such competence. The general conduct of this examination is on similar lines to that of the more general examination.

25. STUDENTS.

The Society admits a limited number of young men to study Gardening in their Garden at Wisley. A certain number of these Working Students have also the advantage of attending many of the Society's meetings and Shows at the Royal Horticultural Hall and elsewhere.

26. INFORMATION.

Fellows may obtain information and advice free of charge from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions by applying to the Secretary, R.H.S., Vincent Square, Westminster, S.W. Where at all practicable, it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

27. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz. a fee of £3. 8s. for one day (or £5. 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their garden.

28. AFFILIATED SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of all local Horticultural, Floral, and Gardening Societies by a scheme of affiliation to the R.H.S. Since this was initiated, more than 200 Societies have joined our ranks, and the number is steadily increasing.

Secretaries of Affiliated Societies can now obtain on application a specimen copy of a new Card which the Council have prepared for the use of Affiliated Societies wishing to have a Card for Certificates, Commendations, &c. It can be used for Fruit or Flowers or Vegetables, and is printed in two colours—art shades of deep blue and green. Price 8s. 6d. for 10 copies, 5s. 6d. for 20, 11s. 6d. for 50, 20s. for 100.

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz. Bronze, 5s. 6d., with case complete; Silver, 12s. 6d., with case complete; Silver-gilt, 16s. 6d., with case complete. Award Cards having the Medal embossed in relief can be sent with the medal if ordered—price 6d. each.

29. FUNGOID PESTS.

(See page cciv.)

Under the title of "Fungoid Pests of Cultivated Plants" the Society has just published an invaluable volume by Dr. M. C. Cooke, M.A., LL.D., V.M.H. It contains 278 pages of letterpress with 28 figures in the text, and coloured illustrations of no less than 357 different fungoid diseases to which cultivated plants are liable. Being so valuable a book and one that will serve as the text-book and reference book of students and practical gardeners for many years to come, it is half-bound in calf and issued at the price of 10s. 6d. net. No one whose plants are subject to fungoid attacks—and whose are not?—should be without this book, for not only can they by its use identify the disease at once, but they are also told both how to treat it and overcome it, and also how to make the different washes and sprays which the different classes of fungoid attacks require.

30. RULES FOR JUDGING.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors" (1905), has been revised throughout and considerably modified from the experience gained during the last five years. The Secretaries of Local Societies are therefore strongly advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1s. 6d. addressed to the Secretary, Horticultural Hall, Vincent Square, Westminster, S.W.

31. VARIETIES OF FRUITS.

The Society has just published a new and greatly revised edition of "Varieties of Fruits." It contains a list of the best Apples for cooking and for dessert; the best Pears, Plums, Damsons, Cherries, Raspberries, Currants, Gooseberries, and Strawberries, showing in each case the best form in which to grow them and the time they ripen. Then follow some few pages of most useful notes on How to Plant, How to Prune, Root-Pruning, Manuring, and on the use of Artificial Manures. At the end are given the names of some of the quite new varieties of Fruits, which promise well but are not yet sufficiently long proved to be recommended for general planting.

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